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Relocating Equipment in a Machine Shop

Improving Operating Conditions Without Buying New Machines or Erecting New Buildings
—First of a Series of Management Discussions

BY FREDERIC SCHREIBMAN*

IN any industry, regardless of kind, size and system already in use there, it is not a very hard matter to introduce improvements which will be considered to be very important. Of course the intelligent and persevering co-operation of the management must be considered as a condition *sine qua non*.

I am here reminded of two reports that I wrote and handed over to the respective managements of two totally different industries, located indeed in two different countries. In both cases the conditions were almost alike and similar to all other cases of the majority of factories all over the world. This is the reason why I am not afraid to make the foregoing statement.

One factory suffered frequently from congestion, which occurred sometimes in one place, sometimes in another. The congestion occurred not only at times of exceptional activity but even when the factory was producing its normal output. To remedy this, it had been proposed at different times and from different sides to construct new additions to the present building.

Close study of the question convinced me that if logical working methods were introduced, it would be possible to eliminate the chronic congestion referred to, and prevent congestion when the factory is working at maximum production. "More than this," the report went on, "it is quite possible, as I will prove hereafter, to increase the maximum productions three times, without being obliged to make radical changes. In fact, to do this:

"a—I do not propose to buy new machines.

"b—I do not propose to build new buildings.

"I advise you only:

"a—To adopt a new location of machines at present used.

"b—To change the location or enlarge certain doors, windows, stairways and elevators.

"c—To strengthen certain parts of the first floor, etc.

"The cost of these changes is quite insignificant when compared with the direct and indirect benefits resulting from the introduction of the above-mentioned changes."

In the other report covering a study of a new layout of a forge shop I proposed to increase actual manufacturing capacity from 50 to 100 per cent, and to save every year 75 per cent of the cost of handling materials.

History of the Average Plant Expansion

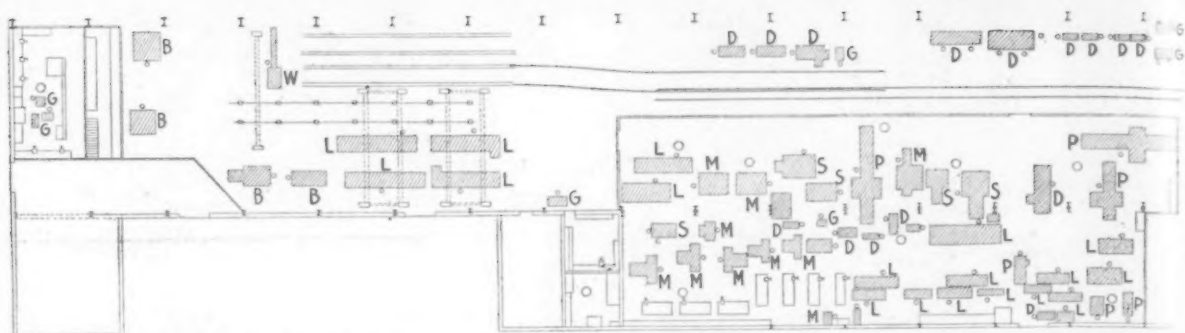
In every factory, even in the best organized, one will find the same things. The only difference is that in some factories all departments are disorganized and poorly equipped, while in other factories only two or three departments are badly organized. Yet this fact does not mean that the remaining departments are well organized.

One of the causes we meet very often is that the majority of the large factories have not always been large; they have attained their present growth little by little. The proprietor of a small shop succeeds in making his business prosperous; he is obliged therefore, to be constantly buying new machinery, and those machines, according to strong expression given by a general manager who is not afraid to speak the truth, are "thrown in in a hurry, never mind where or how." The capacity of the shop becomes more and more inadequate and congestion is inevitable, and normal working of the factory is impossible. To remedy this the management decides to extend the existing small building. It may be due to justified ignorance of the probable growth of the business, or to mere incompetence, but the fact is that the management fixes the capacity of the new building quite at random. The figures adopted are not based on logical reasoning—on the average production of the last ten years, for instance, or on the probable future amount of business.

Concerning the location of the building, here, too, it is not chosen after deep reflection. One of the management simply points his finger in some direction—perhaps I might say in any direction—and says: "We will place the extension here." The only idea for justification of the decision is that one place in a corner of the factory seems to be less busy than another place in another corner of the same factory, and so it is taken.

Finally it is decided to erect a new building, but how to build? What raw materials are to be used—cement, wood, iron, or what? What respective dimensions must be given to the walls, the doors, to the parts of the roof, etc.? They don't know themselves, and, unluckily enough, they don't consider the matter to be of sufficient importance to be handed over to an architectural specialist. They believe, naively, that they can realize economy by doing it themselves. After this, is it any wonder that one will find in almost every factory that there are unsatisfactory buildings; that the capacity of some buildings is not suited to the requirements; that there is lack of light; that the doors are placed in such a manner as to cause drafts all the time; that the columns are weak and do not

*The author, who is a graduate of the University of Liege, was engaged as consultant in industrial management and installation in Brussels, Belgium, when the war interrupted his work. He came to the United States to study American working methods and has now established himself as consulting engineer in industrial matters. The present contribution is to be followed by others on the proper installation of machinery, as in a forge shop; on the handling of materials; the handling of machinery; the handling of men; the waste of labor, etc.



The Machine Shop Before Changes Were Undertaken. In the original plan drawing colors were used to differentiate the different general classes of machines. In the reproduction resort had to be had to letters, so that *L* stands for lathe; *P* for planing machines and shapers; *D* for drilling machines; *B* for boring machines; *G* for grinding machines; *M* for milling machines; *S* for slotting machines; *W* for wheel presses, and *SM* for screw machines. The larger circles represent stoves.

allow the proper placing of cranes, etc.? In a word, the building is an utter failure and causes a constant loss of time and money and a no less constant interference with the normal working conditions of the factory itself.

Again it happens often in such a factory that they need, for instance, a pulley of given dimensions and they cannot find it. As they are in a hurry (in badly organized factories they are always in a hurry, because they do not have the habit of preparing everything ahead—they only think at the last moment) they take a pulley of whatever dimensions may be at their disposal in the storeroom. It is true they promise themselves that they will replace it at the first opportunity with a pulley of proper dimensions, but in some factories the employees change more than should be necessary; in fact, every day employees are discharged and new ones engaged. As no up-to-date records are to be found in this factory—sometimes there isn't the shadow of a record—and the newcomer in this case ignores what has been done by his predecessor, or he does not want to know, or he has no time to study what has been done before, busy as he is with new problems that he has been entrusted with, so consequently he does not bother with the pulleys, belts and other things which his predecessor intended to change at the first opportunity. There are reasons why the "first opportunity" has not presented itself. Consequently, the provisional pulley remains for all time.

Now this happens with not only one pulley, but with many, and the same things that happen to pulleys can very well happen with gears, shafting, belts, and so on. One can easily understand the reason why almost all machines in a factory are located helter-skelter and have not the requisite speed, feed, etc.

A Machine Shop as It Was Found

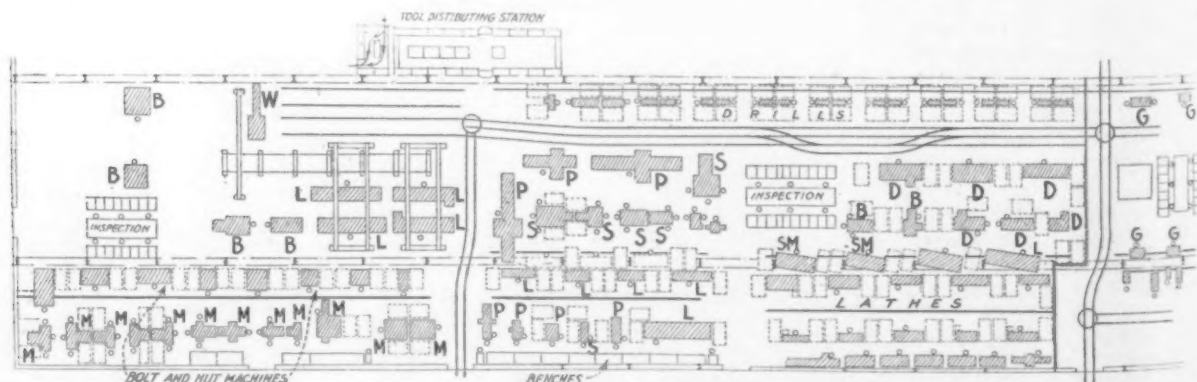
The irrational location of machines and uneconomical use of space in a machine shop are shown in an accompanying drawing. The machines are placed in

all directions without any system and are all mixed up together. One will find milling machines, planers, shaping machines, lathes, etc., in the same corner. The small circles represent the places where the workmen must stay to attend the machines. As thus stationed the workman has the light sometimes at his back and sometimes in his face. The machines are so close together that there is no space to pass between. The case is still more aggravated on account of the fact that in every available space one will find such a large quantity of castings, angle irons, wooden boards and so much rubbish, that if one would go through this shop he must be as agile as his antediluvian father.

While some of the pieces are going through to fill a current order, others are "side-tracked" and wait around for weeks, some probably much longer. In the great majority of cases there is no justification for leaving pieces not required on a current order piled up indefinitely in the working space.

The handling of materials from one spot to another could not be done otherwise than by means of a crane which picks up materials in some places and deposits them where they are needed. The trouble is the service of a crane can only be used in a narrow band of the machine shop which is provided with the crane. The remainder of the shop is devoid of such conveniences as a crane. There are no other means existing in this section whereby materials can be transported from one place to another, unless they are taken piece by piece on the shoulders or in the hands of the laborers, but as it is almost impossible for a person unencumbered with anything to get through the congested place, one wonders how the laborers are to get through.

The handling by means of a crane in that section where it is available is not very practical, and is also very costly. In fact, the manufactured pieces are not gathered in containers, but are thrown directly on the floor, and it remains for the crane to pick them up piece by piece. In the most favorable cases the crane takes a board loaded with several pieces. Though this



Plan of the Same Machine Shop with Machines Rearranged and Space Provided for Extra Machines. The small circles in both plans indicate position of workmen. Two or more circles at a single machine may indicate two or more operators or provision of space for standing at different points. In general on one side of a machine is a box or tray containing the work to be done and on the other a similar receptacle for the finished work. Some nine machines at the left end were left in their existing locations owing to their heavy foundations.

scheme allows the crane to take a larger load at a time (however, rarely exceeding $\frac{1}{2}$ ton) it is dangerous to load many pieces on the one board, as they are likely to drop, injure workmen and become damaged. As no control exists as to what the crane and the laborers ought to do, one can understand how the removing of pieces goes very slowly and is expensive.

As the arrangement is it is absolutely impossible to have tracks installed for running trucks. Besides this, as the floor is not level with the floor of all the neighboring departments, it would be difficult to install a system or network of rails in this factory.

The second drawing shows the same machine shop rearranged with the same machinery grouped by classes of machines and affording space for trays or boxes of materials in process and space for trucking as on narrow-gage tracks. Bolt-cutting and nut-tapping machines have also been included, these being removed from another department of the works. Along the outside wall are sectional benches, and a feature of the rearrangement is the location at convenient points of inspection and supply stations. At the upper left is located a flexible tool-distributing and store room which the author has devised and which it is intended to describe in a separate article.

The Question of the Steel for Rifle Barrels

Need for Steels to Offer Maximum Resistance to Erosion and Yet Meet Machining Strength and Cost Requirements — Present Practice

— BY C. B. LANGSTROTH —

AT the present time it does not seem amiss to discuss rifle barrel steel. The topic of rifles is being discussed widely and the barrel stock has a great deal to do with the accuracy, life, cost and time required to manufacture a barrel, which is the most important component of the rifle.

Soft steel we need scarcely consider, as the use of this class of material in barrels for military purposes has been given up since the introduction of smokeless powder, and by far the largest number of barrels being made at the present time are for military purposes.

Nickel steel is being used for a large number of the military barrels manufactured now and it would be used far more but for the fact that many of the arms companies have had trouble machining this stock due to its not being properly manufactured or not receiving the most suitable heat treatment.

Manganese steel, for a number of years, has been the principal stock from which military rifle barrels have been made and is the material used in making the barrel for the Springfield M '03. This steel has a great deal in its favor, as it can be supplied by a large number of steel plants in a satisfactory condition to drill and rifle, whereas only a limited number of plants are furnishing a satisfactory nickel steel.

The chemical analyses of the steels which have been found to work satisfactorily are as follows:

Analyses of Steels for Rifle Barrels

	Soft	Nickel	Manganese
C. per cent.	0.13 to 0.18	0.30 to 0.40	0.50 to 0.60
Mn. per cent.	0.70 to 0.90	0.50 to 0.60	1.00 to 1.25
P. per cent.	0.07 to 0.12	Not over 0.05	Not over 0.06
Si. per cent.	0.10 to 0.20	0.10 to 0.20	0.15 to 0.25
S. per cent.	0.05 to 0.09	Not over 0.03	Not over 0.06
Ni. per cent. ....	...	3.00 to 4.00	...

Physically these steels should test as shown in the following table and still machine readily:

Physical Characteristics of the Barrel Steels

	Soft	Nickel	Manganese
Elastic limit, lb. per sq. in.	40,000	90,000	75,000
Tensile, maximum lb. per sq. in.	60,000	100,000	110,000
Elongation in 2 in., per cent.	30	20	20
Contraction of area, per cent.	60	60	45

To obtain a uniform stock and eliminate forging strains, the soft steel barrels are normalized by heating to 1625 deg. Fahr., soaking at this temperature for one hour, and are then removed from the furnace to cool in the air. The heating is done in a muffle or semi-muffle furnace and the barrels are charged either directly on the floor of the furnace or on pans. The latter method is the quicker, as the pans may be loaded while

the furnace is heating one charge and this may be removed from the furnace and another full pan placed in the furnace much more rapidly than by charging the individual barrels.

Heat treating the other classes of barrel steels is becoming the general method, as it is found in the drilling and rifling, which are the most difficult machining operations, that better results can be obtained when heat treating is practised than when the physical conditions desired are sought through cold rolling. This latter method is only employed in the barrels made from manganese steel. The process consists of first rolling the outline of the barrel from the billets which are preheated to 1030 deg. Fahr. The barrels are then reheated to 1370 deg. Fahr. and passed between the rolls which give them their final shape. The operation on the blanks is finished at a temperature of 1200 deg. Fahr. The barrels are then straightened under a 500-lb. drop hammer.

Heat Treating of Barrels

Barrels that are to be heat treated are, however, as a rule formed to the required size at the breech end on an upsetting machine and then heated in a semi-muffle furnace. This process has been tried in a semi-continuous furnace but without success up to the time of writing, although there is one concern still working on this method. The temperature generally used for hardening the nickel steel is 1500 to 1525 deg. Fahr., and for the manganese 1475 to 1500 deg., but this has to be varied, depending upon the chemical analysis of the different shipments of steel from which the barrels are to be made. The barrels are brought up to the required temperature in about one to two hours, depending upon their number and the heating factor of the furnace, and then allowed to soak at this temperature for a similar length of time, after which they are quenched in a tank of oil.

The quenching solution is oil, as this is not liable to crack or warp the barrels, and it should be kept at a constant temperature of from 70 to 100 deg. Fahr. Many plants are now equipped with an oil circulating system in which the hot oil is cooled by a refrigerating machine.

Following the hardening of the barrels, the next operation is the drawing to the required physical requirements. This is done in the same type of furnace as is used for the hardening and also in a semi-con-

tinuous furnace, which is in this case very successful. The time required is about the same as for hardening and the temperature ranges from 1100 to 1250 deg. Fahr., depending upon the physical requirements. Every barrel after drawing has a small flat surface ground on the breech end on which the Brinell test is made to determine whether the barrels meet the physical test. If they are too low, they are hardened once more and drawn at a lower temperature; and if they are too high, they are simply redrawn at a higher temperature than previously.

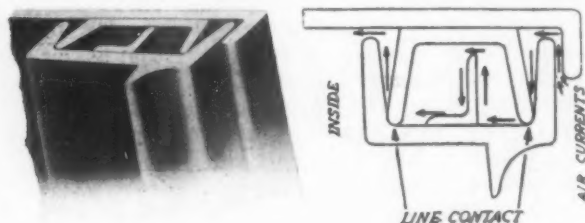
Different Alloy Steels Might Be Studied

So far the arms companies of the United States and the steel manufacturers have not got together to find out what class of steel really is the best for machining for strength and also to give the longest life to the rifle. Many tests have been made by the arms companies on existing materials, but they have not been exhaustive enough to cover all conditions. On large caliber rifles, however, such tests have been rather fully gone into; and if we judge by the results of these tests, the purer the steel the longer the barrel will stand up against erosion, but it being impossible to use steel of this character, owing to its not being sufficiently strong, we must alloy it with some element to raise the physical requirements. These tests also show that the only suitable alloys are ones that have a high fusion point and hence a steel was manufactured that was alloyed with tungsten. This material was found very suitable in its ability to resist erosion, but its cost and difficulty in machining would prevent it from being used for rifle barrels.

In conclusion, we believe that it would be advisable to have more thorough tests made as to the possibilities of changing the composition of the present barrel steels either by introducing some new alloy or a new combination of the alloys now used. As an example we might have a higher silicon and lower manganese content or use alloys of chrome-vanadium or of molybdenum. If it is found impossible to obtain a steel with any marked superiority in resisting erosion, then the chief governing qualities should be the machining properties, strength and cost.

A Vertical Sliding Solid Steel Window

The Detroit Steel Products Company, Detroit, Mich., has placed on the market a type of vertical sliding steel sash for windows, the construction of which is shown in the accompanying illustrations. An angle iron is attached to the sliding section of the sash, protruding into the center of the channel guides. Line contact, it is pointed out, is thus secured between the web of the sash channel and the ends of the flanges



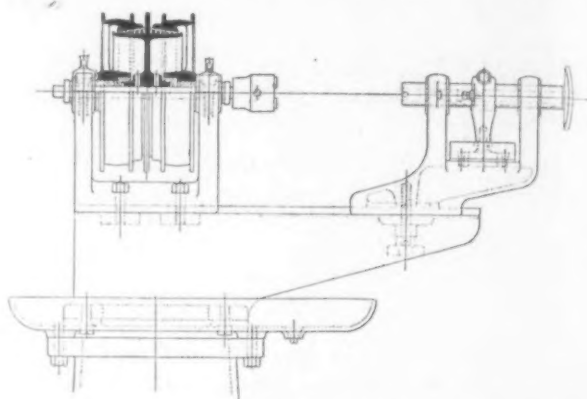
An Angle Is Attached to the Sliding Section of this Vertically Sliding Steel Sash and Projects Into the Center of the Channel Guide Employed, thus Causing Any Air Currents from the Outside of the Building to Change Their Direction Ten Times, as Indicated by the Arrows, Before Reaching the Other Side of the Sash

of the guide channel and the ends of the angle on the sash and the web of the guide channel. With this arrangement the air currents are given ten different directions before they may finally gain entrance to the building. In addition to securing better weathering through this construction it is pointed out that the

sash operates easily as friction is eliminated and the entire member is preserved and protected by paint which is not rubbed off. The two moving sections are counterbalanced to such an extent that 2 or 3 lb. of pressure is found to be all that is required to move a window of this type.

A Special Type of Tapping Machine

A precision tapping machine has been designed and built by the H. E. Harris Engineering Company, Bridgeport, Conn. Among the objects sought in its design were the tapping of accurate holes, a reduction in tap breakage and the securing of a large out-



The Movement of the Work-Carrying Head at the Right Toward the Tapping Head at the Left Causes the Work to Bear Against the Tap and Engages the Forward Driving Pulley at the Extreme Left

put by permitting the operator to use both hands to place and remove the work and employ them for that purpose only.

The machine consists essentially of two heads, one for the tap and the other for the work, and a bed. The tapping head at the left is mounted in a fixed position on the bed and is a casting containing two bearings supporting the rotating tapping spindle. In addition these bearings act as studs for the forward and reverse belt pulleys to rotate upon and provide a thrust bearing for them. The inner surface of the rim of these belt pulleys is bored to act as the internal members of the tap driving clutches. A spider mounted permanently and centrally on the tapping spindle carries the external members of the clutch, a slight longitudinal movement with the spindle being provided to enable a change from one clutch to another to be made. Aluminum is employed for the clutch spider to insure lightness and the periphery of the spider is grooved to give a cushioning grip to the leather friction surfaces and reduce the weight still further. The edges are spun up or outward over the leather, this arrangement being relied upon to prevent oil from getting on the leather or between the clutch surfaces due to either centripetal force or gravity. The construction of the belt pulleys also tends to carry oil away from the frictions.

Oil cups in the pillar supports for the bearings feed oil by the suction caused by centripetal action and by gravity through channels and oil grooves to every moving part. It is explained that the capacity and location of these channels and oil grooves is such that undue waste or spattering of the oil are prevented.

The work carrying head at the right is adjustably mounted on the bed to accommodate large or small work and long or short taps. The work is carried in a simple taper shank fixture fitting into the hollow sliding work spindle. A pin slipping into a notch is relied upon to prevent the fixture from turning in the work spindle and that in turn is prevented from rotating by an adjustable clamp dog carrying a hardened steel stud upon which a roller with an intermediate slip bushing to reduce friction rotates. All of these parts are hardened and ground and work in a hardened and ground channel piece, which, it is emphasized,

prevents rotation but permits longitudinal motion without the retarding friction of a key when under rotative pressure. Rough adjustments for the size of the work, length of tap and depth of hole are made by adjusting the whole work carrying head longitudinally on the bed and the clamp dog on the spindle. A finely threaded hardened steel adjusting screw, which is tapped into the clamp dog and bears against a hardened steel stop or button in the tailstock, provides a fine adjustment for exact depth.

In operation the fixture is placed in the taper hole of the work spindle and the tap is placed in the tap spindle. The work carrying head is next set to approximately the proper position and the clamp dog and stop screw set to the correct depth. The operator then stands with his chest opposite the breast pad at the extreme right of the work spindle and facing toward the point of the tap at the left. A piece of untapped work is picked up with the right hand and placed in the fixture and a light pressure applied to the breast pad. This pressure is transferred to the cutting end of the tap and causes the spider friction to engage that of the forward driving pulley at the left of the tapping head. The operator then removes his right hand from the work in the fixture and reaches for a new piece of work, a slight forward pressure being maintained to keep the friction engaged. During the tapping operation the left hand is placed on the work in the fixture.

When the proper depth of hole is reached, a slight backward pull on the work with the left hand disengages the friction and the spider and tapping spindle come to a stop and the reverse driving pulley and clutch at right of the tapping head are engaged to reverse the tapping spindle. This motion brings the breast pad back against the operator's chest and he removes the tapped piece from the fixture with his left hand and at the same time picks up a second piece with his right. As this new work is placed in the fixture the finished piece is placed in a tray at his left side and work on the second piece started by applying pressure to the breast pad.

Details of Gas-Producer Operation

"Operating Details of Gas Producers" is the title of Bulletin 109, by R. H. Fernald, professor of mechanical engineering, University of Pennsylvania, recently published by the United States Bureau of Mines.

Mr. Fernald discusses the producer-gas-plant situation as it exists in the country to-day, and also compares the producer-gas plant with the steam turbine. He says:

The steam turbine naturally lent itself to central-station service. It was a unit easily understood; it could be readily erected without radical changes in the boiler-room equipment; and it rapidly met the demand for large central-station units. The producer-gas plant was an untried factor; it met with strong opposition from those who saw possibilities of being forced out of their positions; its installation meant a complete renovation of the entire plant, with the replacing of the steam boiler by the producer unit. Large units of this type did not materialize, with the natural result that even to-day the producer-gas power plant is not the large central-station unit, although it occupies a strong position among the isolated plants and the small central stations.

Several unsuccessful attempts have been made by various organizations to collect data relating to these important matters, but unfortunately little or no information could be had. Appreciating the value of such data in connection with the many problems of fuel conservation and its investigations into the use of producer-gas power, the Bureau of Mines decided that an effort should be made to procure operating details from a small number of representative producer-gas plants using scrubbed gas either for power or heating purposes and that primarily data from plants using bituminous coals and lignites should be sought, but that data from a few of the larger anthracite plants and the oil and wood plants should be included.

With these points in mind, data sheets were sent to the owners of a limited number of plants, and the response has been highly gratifying. Returns of a positive character were received from 39 installations. It is believed that in this bulletin sufficient detailed information is presented to provoke wholesome discussion on the part of those interested in this form of power, and to serve as a basis for comparison by the different operators of similar plants.

Tool for Extracting Broken Set Screws

The Cleveland Twist Drill Company, Cleveland, Ohio, has developed a tool for extracting broken set and cap screws, studs, staybolts, etc. It is known as the Ezy-Out screw extractor and operates on much the same principle as that employed by the ordinary corkscrew as it bites its way into the cork, secures a purchase and then backs the cork out, although in this case the broken screw is backed out on its own threads. These tools are made in three different sizes covering practically all machine shop requirements and are supplied in sets.

The extractor is made of steel that has been given special treatment to enable it to withstand the torsional strains to which it is naturally subjected in use. To remove a broken screw or stud with the extractor a hole is drilled in the portion remaining, as shown at the left of the accompanying illustration. The extractor is then inserted, a slight twist being given to seat it firmly. This causes the left-hand corkscrew-like spirals of the extractor to grip the sides of the drilled hole and exert a twisting or rather an untwisting action on the broken screw. It is emphasized that the tighter the screw sticks the harder the

To Remove a Broken Set Screw, Staybolt, Cap Screw or Stud a Hole is Drilled in the Broken Screw After Which the Extractor is Inserted and the Screw Backed Out on Its Own Threads, as Shown at the Right



extractor grips and twists and the screw soon is backed out of the hole on its own threads easily and quickly. In addition to effecting a reduction in the time required to remove a broken screw, it is also pointed out that the work is accomplished without danger to the threads of the hole.

A New Soldering Iron of the Electric Type

The Cutler-Hammer Mfg. Company, Milwaukee, Wis., has developed a new type of electric soldering iron. Five standard sizes ranging from $\frac{1}{8}$ to $1\frac{1}{4}$ in. in diameter are made and the electric heating unit is hermetically sealed inside the body, thus preventing moisture, heated solder or flux from penetrating a joint and coming in contact with the wire of the heating unit. Steel is also employed for the body to eliminate the likelihood of seams opening on account of unequal expansion. The copper tip does not screw into a hole in the body but screws over a threaded core projecting from the latter. In this way the heat is led directly to the tip and concentrated where it is required. In addition to soldering the iron can also be employed for melting wax, branding, etc.

The committee on industrial relations appointed by Mayor Mitchel, of New York City, met a committee of the New York-New Jersey branch of the National Metal Trades Association at the office of the association, 30 Church Street, New York, on Thursday, Jan. 4. They formed plans of organization and discussed means of obtaining information for a survey of the metal working industry.

The Financial Organization of Factories

A Synopsis of the Methods That Are Needed for Economical Production and the Building Up of Business

BY EDWIN L. ORDE

THE primary object of all cost systems is to obtain a record of the amount of money spent on labor and material, to ascertain the proportion of the expense of working the factory to be added to these two items, and to present (1) the total net cost of every production and (2) such divisions and subdivisions of the cost as may be considered by the management most likely to enable a close scrutiny of working processes to be made and a continuous comparison with corresponding items in the estimates.

Four essentials of a good cost system are: (1) Accuracy; (2) simplicity; (3) rapidity; (4) elasticity.

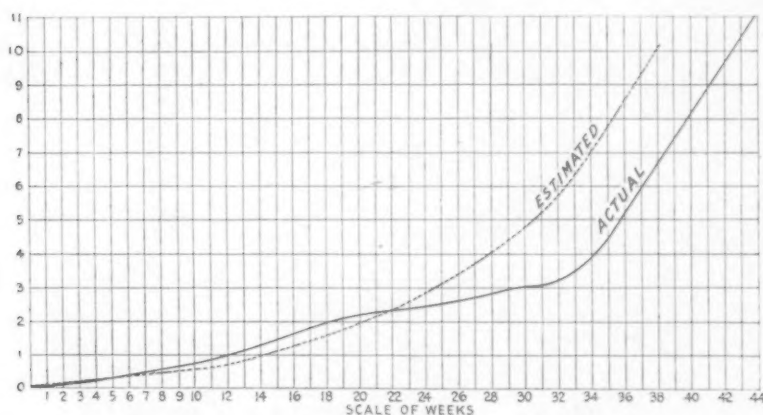


Fig. 1—Cost Progress Curve; Steel Plant Wages

This seems sufficiently obvious, but writers on these subjects complain that elaboration of detail is only too apt to increase to a point where the cost of working the system becomes unduly high. The case of Woolwich Arsenal is quoted, where in 1906 over 4 per cent of the total wage bill was spent on clerical administrative labor.

Time, Material and Other Records

Accuracy in recording time is of the first importance and at the same time most difficult to insure. When work is constant and is paid on piece rates, the returns are probably as correct as is necessary, but when a man on time rate is employed on a number of comparatively short operations for various orders, the difficulty of accurate record becomes greater and attempts to meet it probably costly. As a general principle it would seem that foremen should be involved in the timekeeping system to an extent which shall influence them in spreading the work as evenly as possible, so as to avoid the difficulty referred to above, but at the same time shall not interfere to any harmful extent with their real function, the distribution and technical supervision of the work.

Much attention has been paid to the storehouse by various writers, as it constitutes a possible source of leakage which is difficult to detect unless the cost system is carefully designed and applied. A well arranged system of cards seems to offer the best solution and to give the clerical department complete information in a form which is readily accessible. In the design and application of the system, however, there should always be the closest possible collaboration between the accountants' department and the technical management. In fluctuating markets the storehouse requires considerable attention, for the ad-

justment of the rates at which various articles should be issued must exercise an important effect on the cost of the product and on future estimates. As a general rule it seems that the market rate at the date of issue or at the nearest date that can conveniently be ascertained should be taken and any profit or loss dealt with in the stores account. Unless this is done direct comparison between the market rates and the cost of the product becomes impossible and future estimates based on these costs are misleading.

Materials ordered direct for contracts pass through the ordinary books required by the system in use, and materials for stock through the storehouse or yard and can be suitably recorded on cards.

Estimating

Much has been written on the superiority of American methods of cost keeping and estimating, and so far as the writer has been able to ascertain they possess the attractive feature of rapidity. There can be no doubt that the best way of obtaining accuracy is to be found in a system which enables results to be recorded within a few days after the work is finished, and the details are still fresh in the memories of those concerned in it. The estimating department then has the knowledge that the net costs on which its work is based are the result of immediate inquiry and investigation when discrepancies occur, and so can be used in a new estimate without any misgivings. Another feature of what may be called the American system of estimating is the employment of technical men as estimators both of quantities and rates. These technical men generally specialize in one main department or group of departments, analyze net cost figures, bring them up to date, and work them into forms which they find most suitable for preparing estimates for the cost of work carried on in their own special department. In the highest development of the system they fix rates for various classes of work. The advantages of the system are:

1. Technical peculiarities which should prevent the net cost figures of one contract serving as a basis for another, might pass unnoticed by any non-technical man and so spoil an estimate.

2. The technical estimating staff is in constant touch with the net cost system, and should be able to devise methods of presenting figures to the management which can be prepared by the net cost clerks and so keep the present and future work on a correct cost basis.

On the other hand the system must be costly if it is really to be efficient, though this will be perhaps recouped in works where there is much estimating to be done, by the accuracy and rapidity which will be attained by such a system in the hands of competent men. The inherent weakness of the system of estimating in general use in this country [Great Britain] i.e., the calculation of quantities by technical men and rates by net cost clerks, lies in the difficulty experienced by the net cost clerk in fixing his rates judiciously, owing to his lack of technical experience.

It is impossible in this as in other details of financial organization to dogmatize or to fix on any one system which is applicable to every factory. The writer, however, considers that a judicious blend of the estimating draftsmen and net cost clerks can be made which will bring out the best qualities of both

*From a paper on "Works Organization," presented at a meeting of the North-East Coast Institution of Engineers and Shipbuilders, Newcastle-upon-Tyne, Oct. 26.

departments, and so produce sufficiently accurate estimates for presentation to the managers. These are responsible for the cost of carrying out the work, and should therefore examine all estimates before they are used for bids.

The system of doing the whole of this work by means of a technical staff has an advantage over the net cost clerk system in that the technical staff, when not actually engaged in estimating, can be occupied in watching net costs as the work progresses, and in devising means whereby they can be compared with the estimates at all stages. This will keep the management closely in touch with the financial aspect of the operation.

A close comparison between the cost of work in progress and the estimate is, of course, difficult to make, unless a large and expensive staff is maintained for the purpose. Such a staff will insure that wages can be quickly abstracted and compared with the corresponding items in the estimate, without allowing a delay to make possible the occurrence of grave differences without being noticed. This can to some extent be arranged by plotting cost progress curves, of which the ordinates represent money, and the abscissae, time. If the scales are judiciously chosen, the estimate curve can be made to assume so definite a character that any marked difference between it and the actual cost curve, when it is plotted, can be seen, probably one or two weeks before it begins to assume serious proportions. Fig. 1 is an actual case where the steel wages measure the progress of a ship up to the date of launching. A similar system can be applied to other trades. It constitutes a valuable check on the progress and cost of the work, without entailing an extravagant clerical staff.

The ordinary bookkeeping systems have been criticized, over-hauled and improved until there is little more to be done except perhaps in minor details. But the full development of a good net cost system and the establishment of a close connection between the cost, estimating and constructive departments on the lines indicated above deserve the careful attention of all those concerned with factory organization. The best results are likely to be obtained by the closest possible combination between accountants and engineers. If either is eliminated some essential element of success will surely be forgotten.

Overhead Charges

No discussion on the financial organization of factories, so far as it affects internal work, should disregard the great and vexed question of establishment (overhead) charges. The closeness of the estimating and the accuracy of the net cost systems are indicated clearly by the number of items placed under the head of indirect charges. When there are few, the work is well sub-divided and a good measure of accuracy may be counted upon; when there are many, the opposite may be confidently expected.

The basis on which indirect charges should be calculated in cost keeping and estimating has been argued at considerable length by manufacturers, and it has been held that some percentage should be taken of the total cost of labor and material.

Let us imagine two sister ships, one plated with ordinary steel and the other with galvanized steel. The actual labor cost and works expenditure account to be covered by establishment charges would probably not show any very large difference between them. But a percentage on the sum of labor and material costs would show something rather substantial in favor of the second vessel. This argument in one form or another seems to show that the only correct basis on which charges should be calculated for net cost and estimating purposes is the labor cost. On the other hand where contracts are placed on a time and material basis, it is probably a benefit to the purchasers to fix charges on material and labor, as this

gives them an inducement to check extravagance in the choice of material.

The sub-division of charges is a question which probably never will be finally settled, for conditions in engineering works are constantly changing, and though elasticity is claimed as an essential of a good cost system, this quality must sometimes fail under new developments, and changes must be made. In engineering works where a large amount of the work is done on machine tools, it is probably advisable to charge all such capital cost items under a special heading, and provide for them by fixing a rate for each machine which is added to the cost of all the work which it produces.

The extent to which this should be carried, how far shop charges should be kept separate from establishment charges proper, whether it is advisable to separate shop and departmental from distribution and general charges, and many questions of this kind can only be decided by the exigencies of the particular business. It would seem, however, that the greatest accuracy may be expected where the items under direct charges are many, and those under indirect charges few. The best facilities for scrutiny by the management will be provided if sub-division is carefully made on this line.

The cost of estimating and bidding is an item which should be carefully kept if only as a record of the unproductive work, and a guide as to how and where it has been apportioned. This brings under review the idiosyncrasies of customers in regard to the demands they make on the estimating staff, compared with the value of the orders given, and may form an important factor in deciding policy.

What a Cost System Should Show

The perfect cost system should be capable of showing at a glance the cost of work as it proceeds, but unfortunately that system is yet to be devised. It may, however, be taken, that in most factories, shipyards, or engine works, some little signals can be set up which will be serviceable symptoms of the financial health of the place.

Some of these are: Weekly returns of material and wages showing how they are apportioned; weekly output of various trades; machine time worked, and many similar data which can be easily collected and

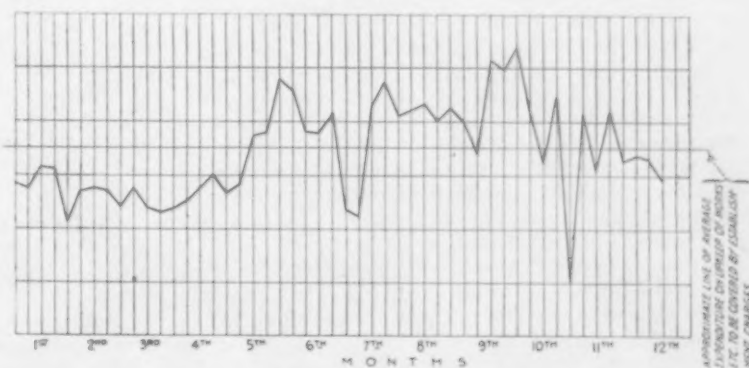


Fig. 2—Characteristic Curve of 12 Months Riveting Outfit

applied as best suits the particular trade or the requirements of the management. In this, as in all detailed cost accounting, the exercise of discretion is required in deciding the extent to which details shall be carried. The case of Woolwich Arsenal has been quoted above. It is easy to imagine that there may be many others. The output of shipyards can to some extent be shown by the number of rivets worked, provided proper correction can be made for difficult work, bad weather, holidays or other causes which reduce output. A comparison of these results and, say, the charges, requirements of the yard or the volume of work in hand is often a useful guide as to general progress. A characteristic curve (Fig. 2) illustrates this. No doubt numerous checks such as this have been devised and are in use in most manufacturing

establishments where the financial organization has been studied. They can easily be worked out by collaboration between the management and the accounting department. This collaboration should always exist and be encouraged, for by no other means can the financial aspect of the work be shown quickly and accurately. Without this information it is impossible for the management to judge whether or not the whole organization is in phase, to apply the necessary corrections if required; and at the same time to exercise such supervision over the estimate as is essential in preparing tenders.

Financial Organization for Foreign Trade*

So far only the internal finance of factories has been considered, but a very large and important question is opened when the finance connected with the disposal of the product comes under discussion, for it points to the desirability of reconstituting or perhaps creating financial institutions, banks or trading companies, which shall help to build up trade abroad.

In the writer's view the first great necessity is a banking company (subsidized by the Government if need be, or relying on its own resources if these are sufficiently strong) which shall finance manufacturers who find it necessary to grant long credit terms to foreign customers. Germany's success in securing such trade is largely due to this, and her example will no doubt be followed by countries who are better equipped with capital than ever before, have developed manufactures and require markets. American institutions of this kind are already in existence, and have no doubt done much to foster trade during the war. It should not be impossible to devise means for relieving the ordinary bank depositors of the trade risks by underwriting as is done in Germany, by associations of insurance companies, who guarantee the purchasers' obligations at a fixed rate of interest. An institution of this kind has been established in England for the furtherance of trade with Italy. This has a capital of £1,000,000, and for the next ten years a subsidy of £50,000, but for the development of trade with, for instance, Russia, a bank of this kind would have to be on a much larger scale.

The financing of trade would not be the only function of such a bank, it would also arrange to collect by means of trade and banking connections, all such information as is essential in building up a trade organization. This would be distributed among the potential purchasers and traders as found desirable, and thus lay the foundations of business relations which only require satisfactory production from the factories to develop them into permanent connections.

The organization should probably be a combination of banks, merchants and manufacturers supported by the Government financially if necessary and through international channels whenever and wherever required, but should not be under Government control. No small private companies should be allowed to enjoy similar facilities, at all events until after the current of trade with this country is firmly established. It is necessary that all our forces of this kind should be concentrated and directed towards the one object in their fullest strength and rapidity, conditions which it is impossible to obtain if competition between small forces is permitted.

The details of the work to be carried out by such an institution are numerous and comprise:

- (a) Translation into the particular language and numeral system of communications between buyers and sellers, in fact, all the literature of the trade.
- (b) The dissemination in the proper direction of all such information as may spread full knowledge of the products of firms involved.
- (c) The collection of information regarding the requirements and standing of possible purchasers.

*It must be borne in mind that what follows was written with especial reference to building up the foreign trade of Great Britain.

- (d) The training and development of suitable men to act as pioneers of trade, who shall have sufficient technical knowledge to appreciate possibilities, understand and overcome difficulties, and sufficient standing to be entrusted with powers to negotiate contracts if necessary.

Christmas Funds Added to a Monthly Bonus

A Christmas distribution of company earnings to employees was made this year by the Cincinnati Planer Company, the Acme Machine Tool Company and the Greaves-Klusman Tool Company, Cincinnati. In addition to a special bonus of 10 per cent of the total earnings of employees each month, which bonus is payable the second Thursday of the month following, the three concerns mentioned decided last February that this method of distribution could still be improved upon by rewarding additionally those employees who are earnest in the performance of their work and regular in attendance, and who form the nucleus and backbone of the organization. So the idea was conceived to create a Christmas savings fund, consisting of 5 per cent of the total earnings of the employee, which would be paid to the employee with 3 per cent interest on the day before Christmas.

The principle upon which the fund was accumulated was that each employee who was absent not more than one day in the month without excuse, or late not more than one day in the week without excuse, would be entitled to 5 per cent of his earnings for that particular month. Each month constituted a unit by itself. While an employee by too frequent absences or by being late too often might forfeit the benefits for that particular month, the opportunity was given to acquire this 5 per cent Christmas savings fund for any subsequent month; and the right is not forfeited to any previous month where the fund was earned.

The plan has worked out satisfactorily, and the companies named distributed specially printed checks on Christmas savings fund aggregating a little over \$20,000 for the three concerns. The checks were mailed on the evening of Dec. 20 to the homes of the employees, accompanied by a letter printed in red and green explaining the operation of the fund and emphasizing that the object is "to encourage co-operation; to foster industry and economy, and to strengthen that spirit of good-will and fellowship between employer and employee which is so essential to the success of both."

Owing to the satisfactory working of the plan over the eleven months of 1916 the three companies have decided to place the same plan in operation this year.

Some useful metric conversion tables have been published in handy form by Edward Le Bas & Co., iron, steel and metal merchants of London, England, with offices at 82 Beaver Street, New York City. Besides affording the opportunity, for example, of determining the equivalent of whole numbers and fractions of inches, feet and yards in metric units, and likewise of weights and liquid measure, the tables include such conversions as the equivalent for any given number of kilograms per square centimeter in terms of the number of pounds per square inch and so on. It is probable that a copy of the table or reckoner, as it is called, may be obtained for a nominal sum.

Milwaukee is left with practically no Lake transportation service by the decision of the Great Lakes Transportation Company to discontinue operations between Milwaukee, Chicago and other Lake ports. Since the Panama Canal act in 1914 caused a divorce of water and railroad lines, this company has furnished practically the only means of water transportation for Milwaukee and Chicago. The traffic, it is said, has proved unprofitable and, so far as Lake Michigan is concerned, has been discontinued.

J. H. Williams & Co.'s Bonus System

In view of the increased cost of living, due to abnormal world conditions, and as an expression of appreciation of the loyalty of their employees, J. H. Williams & Co., Brooklyn and Buffalo, N. Y., have placed in operation a system of bonus payments for their entire organization which comprises more than 1000 men. They state that they have no so-called war business. The provisions of the system, as announced to the employees Dec. 22, are as follows:

Bonuses will be based on 13 weeks' pay at a time and paid on the next following pay-day to all men in the company's employ at that time. Thus, the first bonus will be paid April 7, based on the payrolls from Jan. 6 to March 31, inclusive, and thereafter the bonuses will follow 13 weeks apart, for as long as the present abnormal business conditions shall permit, subject however to the company's option to discontinue the system at any time upon giving notice to that effect. The normal rate of the bonus based upon the rate of pay will be as follows:

Weekly or Yearly Pay.

- (A) Less than \$1,250 per year, 10 per cent.
- (B) Equal to \$1,250 but less than \$2,000, 7½ per cent.
- (C) Equal to \$2,000 or more, 5 per cent.

Hourly Pay

- (D) Less than 45 c., 10 per cent.
- (E) Equal to 45 c., but less than 60 c., 7½ per cent.
- (F) Equal to 60 c. or more, 5 per cent.
- (G) Bonus for all piece work will be figured at 5 per cent. including overtime.

The proportion of the normal rate earned by each man will be the proportion of hours he works to the full number of regular shop hours operated in his department, exclusive of overtime. Thus, if the department runs 54 hr. of regular time, a man working 50 hr. of regular time will receive credit for 50/54 of the normal rate for the hours he actually works. No bonus will be paid on overtime where time and a half is paid; this is a 50 per cent bonus of itself. Any man who is laid off by the company (not discharged) will be paid his bonus immediately for the full time of his past service, but no bonus will be paid to those who shall have voluntarily left the company's employ.

Destructive Effect of Gases on Platinum

Some new experiments lately made by Mylius and Hüttner at the Physical-Technical Institute in Berlin show that coal gas has a destructive influence on technical platinum at 600 deg. C., causing a layer of soot which, on subsequent burning, leaves behind the metal in contact with it, in a porous state. Synthetic coal gas at 600 deg. C. remains indifferent toward pure platinum and pure platinum-iridium sheets. The effect of coal gas is due to its carbon disulphide, which combines chemically with the platinum, forming unstable compounds, which at 600 deg. are reduced to sulphuretted hydrogen and carbide-like residues. The impurities in platinum, especially iron and rhodium, have a great influence on the formation of soot by the heated coal gas. With rhodium the reaction begins as low as 100 deg. C., and pure platinum can be distinguished from impure in this way.

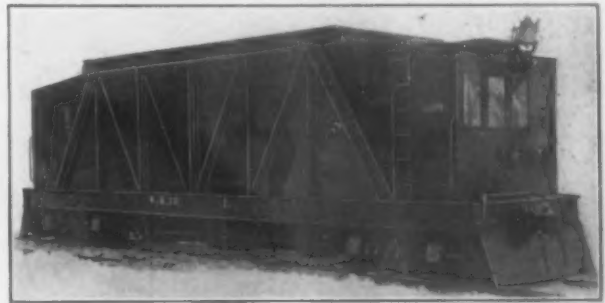
Effects similar to those with coal gas are shown with other luminous flames. In the effect of gas flames with a plentiful current of air, as in the case of Bunsen burners or blast engines, the destructive attack on pure platinum is principally limited to the volatilization of small quantities of the metal. To ensure the durability of the platinum utensils the gas must not contain a large proportion of sulphur, while a plentiful supply of air is of the greatest importance. A small iridium content in the platinum is harmless, but rhodium gives rise to disturbances.

The Ferguson Steel & Iron Company, Buffalo, N. Y., is building a new fabricating shop, 130 x 500 ft., adjacent to its present plant in East Buffalo. The company will then have one of the largest warehouses and fabricating plants in the State of New York. All the equipment has been purchased and construction work has been started. The new shop is to be ready for work in a few months.

A 50-Ton Ore and Lime Transfer Car

A new 50-ton transfer car for ore and limestone has been brought out by the Atlas Car & Mfg. Company, Cleveland, Ohio. This car is provided with two pairs of hopper gates that are operated separately or simultaneously at the option of the operator. The gates are of the rolling type arranged to roll open and leave a large clear passage in the center of the track. It is stated that they can be opened and the car unloaded in 5 sec. The position of the gates is indicated on a dial in each cab and the gates are arranged so that they will cut through the ore and close even though the storage bin does not have sufficient capacity to take care of the entire contents of the car. Each set of gates is provided with an individual drive consisting of a 7½-hp. crane motor directly connected to a worm gear mounted in an oil tight casing and operating in an oil bath.

Two cabs are provided, one at either end of the car. These contain the controlling devices, brake valves, door opening mechanism, etc. The propelling power consists of four 60-hp. motors controlled by a magnetic controller which can be operated from either cab. Each end of the car is equipped with a plow for leveling off the ore or stone between the rails. The car is capable of operating on curves of 150-ft. radius. It is equipped with all required safety appliances and has a motor-driven air compressor, air-operated whistle and bell,



This 50-Ton Transfer Car for Ore and Limestone is Equipped with Two Pairs of Rolling Type Hopper Gates That Leave a Large Clear Opening Above the Center of the Track and Can Cut Through the Material Being Handled if It is Necessary to Keep a Portion of the Load in the Car

electric headlight, sanders and airbrakes. All wiring is inclosed in conduits.

The car is built for standard-gage tracks and has rolled steel wheels 36 in. in diameter. Its over-all width is 9½ ft., the height from the top of the rail to the top of the car, 12½ ft. and its length over the striking plates, 42 ft.

India's Tungsten Output

The tungsten or wolfram ore output of Burma, India, according to completed figures for 1915, was 46,293 cwt., compared with 43,752 cwt. in 1914. It was 32,091½ cwt. in 1913, 32,224½ cwt. in 1912, and 25,357 cwt. in 1911. This district is one of the largest tungsten producers in the world. Before the war it all went to Germany but now English smelters handle the entire output. Recent data show that from Jan. 1 to Oct. 7, 1916, there were 2702 tons of this ore exported compared with 1844 tons in the same period in 1915.

A decision by the Supreme Court of the United States in the case of the Louisville Bridge Company, which is reconstructing its bridge across the Ohio River at Louisville, Ky., means that the company will have to increase its outlay by about \$400,000, constructing a 600-ft. span over one channel and a 200-ft. lift span over the canal.

A tax of 10 cents per ton on all iron ore mined in Wisconsin and 2 cents per ton for all iron ore passing through Wisconsin is proposed in a bill introduced in the Wisconsin Legislature.

Government Report on Munition Making

Special Board Disapproves Strongly of Billion-Dollar Project Deemed Necessary and Urges Immediate Action to Use Private Plant Facilities

WASHINGTON, D. C., Jan. 16, 1917.—Arguments of the most convincing character against the project urged in Congress for the exclusive manufacture by the Government of all the war material it may need at any time are embraced in the report of the board recently appointed by the Secretary of War to make a comprehensive investigation of the entire subject. Not only does the board find that it would be impracticable, if not impossible, for the Government to provide facilities for the production of all the munitions it might need in an emergency, but it points very forcibly to the fact that private manufacturing plants in this country, developed as the result of the European demand for war material, stand ready to co-operate with the Government to any extent in supplying material at far less cost than it could be obtained through Government manufacture, and that this capacity for co-operation can be maintained indefinitely at a relatively small expense if Congress will grant to the Secretary of War the necessary authority to provide special equipment for the production of material made to United States army standards.

The board appointed by the Secretary of War consisted of Col. Francis J. Kernan, Lieut.-Col. Charles P. Summerall, Maj. Lawson M. Fuller, U. S. A., and Benedict Crowell, Cleveland, and R. Goodwyn Rhett, Charleston, S. C., a banker and president of the Chamber of Commerce of the United States. It began its work by visiting the private plants of the Bausch & Lomb Optical Company, Rochester, N. Y.; Bethlehem Steel Works, South Bethlehem, Pa.; Colt's Patent Fire Arm Mfg. Co., Hartford; Remington Arms Company, Iliion, N. Y.; Savage Arms Company, Utica, N. Y.; Winchester Repeating Arms Company, New Haven; American & British Ordnance Company, Bridgeport, Conn.; Midvale Steel & Ordnance Company, Philadelphia, and Root & Vandervoort Engineering Company, East Moline, Ill. The board also conferred with representatives of the Allis-Chalmers Mfg. Company, Milwaukee; American Radiator Company, Chicago; American Locomotive Company, New York; Brown & Sharpe Mfg. Company, Providence; Cincinnati Milling Co., Cincinnati; Dupont Powder Company, Wilmington, Del.; General Electric Company, Schenectady, N. Y.; Greenfield Tap & Die Company, Greenfield, Mass.; Remington Arms Union Metallic Cartridge Company, Iliion, N. Y., and Winchester Repeating Arms Company, New Haven.

Why Government Costs Are Comparatively Low

The board first considered the question of the comparative cost of the production of war material on a moderate scale in the Government arsenals and by private manufacturers, reaching conclusions which are set forth in the report as follows:

"An examination of the data obtained discloses that with few exceptions the Government cost is less than the corresponding purchase price. This result should cause no surprise. Indeed, had a contrary state of facts been shown, a grave indictment of the Government plants would have resulted. For, considering the question abstractly, it appears at once that the Government cost should be less, and considerably less, as a general rule, than the private manufacturer's price, and this without any imputation upon the efficiency or the business policy of the latter. The Government has no selling expense; it carries no insurance, but merely pays its fire and accident losses at their actual cost, estimated at about three-tenths per cent; its borrowing ability, as related to the cost of its investment, is exercised at a much lower interest rate; it has the advantage of long-continued experience in a few specialized lines, and, finally, it makes no profit. In all of these particulars it has the advantage of the private

owner and its cost therefore should be appreciably less than the private manufacturer's selling price, unless, as might happen, some exceptional advantage may, in a particular case, overbalance the conditions enumerated."

For Government Munition Plants \$937,000,000 Needed

The board then considers the estimates submitted by the Ordnance Bureau covering merely extensions to meet, without the assistance of private plants, the immediate needs of the War Department in the way of current expenditures and the slow accumulation of a reserve for an army of 1,000,000 men. These estimates call for an appropriation of \$52,000,000. A second estimate, which covers the additional plants required to meet war needs, without calling upon private plants, based upon the requirements of 1,000,000 men in the first year of war and to equip and maintain a second million for such part of the first year of war as this second million could participate in, calls for \$496,000,000. A third estimate, differing from the second by supposing 3,000,000 men additional to the original 1,000,000 to be brought into service during the first year of the war, calls for additions to the existing arsenals costing \$937,000,000. All of these estimates are on a one-shift basis and none of them includes the price of new sites.

In commenting upon these figures the board says that "such sidelights as could be gotten by inquiries from experienced private manufacturers confirm beyond all doubt the salient fact that the cost of plants fully equipped and adequate in output to the possible needs of this country in a great war is enormous." As to the capacity of the arsenals to meet even the present requirements of the army, the board points out that none of these establishments is running to full capacity, a fact partly due to the size of the appropriations heretofore made and partly to the difficulty of securing labor. The board adds, however, that capacity "has no significance except as it bears relation to needs and so considered the utmost capacity of our several arsenals is below even the prospective peace needs of our expanded military establishment, and it fades into insignificance when the possible demands of war are called to mind."

Private Plant Prices and Continuous Orders

The savings effected in the past four years by reason of Government manufacture are analyzed by the board in considerable detail, and the deduction is made that the private manufacturer who has supplied material for the use of the army has added to the Government cost only an average of about 11 per cent to represent his profits. Commenting on this deduction the board says:

"It is plain that articles for which special machinery has to be installed and perhaps special buildings erected, if purchased sporadically, can not be obtained at very close prices. Sound business practice would make it imperative to include in its cost a large depreciation charge. If continuous orders could be counted on this charge would necessarily be considerably reduced. Any plan of co-operation to that end would not only result in a saving to the Government in the price paid, but it would co-ordinate an organization that would be of the utmost importance to it in time of trouble."

As to the feasibility and practicability of the Government undertaking to manufacture all its arms, munitions and equipment the board says:

"First, let the question of supplying the needful arms, ammunition and equipment exclusively through Government plants be examined. The highest estimate submitted by the Chief of Ordnance must be taken,

because no rational person would set about preparing for a vital need and take the chance of erring on the lesser side. To do so may be fatal.

The estimates given are approximations only—and necessarily so. But for our purposes it is immaterial whether the sum required is \$927,000,000 or \$1,000,000,000 or \$800,000,000. In any event the sum is enormous. The plants erected would be in large part idle in the years of peace and deteriorating with each year. At the same time they would be each year passing, in more or less degree, into the category of the obsolete; that is, becoming a dead loss. This results from two facts—first, their output has no commercial market in peace times; and second, their capacity far exceeds the public requirements in these same peace times. Moreover, the most important factor is wanting, i.e., the organizations. It takes more time and costs more money to acquire these organizations than any other element of manufacture. If no other plan offered, a reasonable man might be driven to advocate it as the only available way to insure against a great national calamity.

Present Advantages Which Should Be Seized

"But other ways are open, ways by which productive capital will not be locked up in complete idleness but which will still hold the country in readiness against the critical day. First, the people have been aroused from their dreams of unbroken peace by the appalling European war so suddenly begun and waged with such unexampled energy. Second, the demands of the foreign combatants for arms and ammunition have developed in this country a capacity to make them a thousandfold greater than was dreamed of in July, 1914.

"It seems to this board that prompt advantage should be taken of the peculiar conditions that now exist—that is to say, of the aroused public consciousness of danger and of the suddenly developed capacity of the American industrial world for the production of arms, ammunition and equipment—before that capacity be destroyed by the scrapping or exporting of the machinery, which, with the organized personnel, constitutes the essence of it.

"The first estimate of cost from the Chief of Ordnance, calling for an expenditure of \$52,000,000, calls for brief comment. Its purpose would be to so enlarge our existing arsenals as to take care of our current peace needs, while building up, through a long term of years, a reserve of arms, ammunition and equipment for 1,000,000 men and for the field artillery called for by the approved Treat board's program and certain additional seacoast arms and armament.

"If carried out as a policy this plan would work evil in two comprehensive ways. First, it makes no provision for supplying the necessarily increased demands when war comes, but leaves the very essence of genuine preparedness to be improvised when war is upon us. Second, it destroys the capacity of all private plants to give assistance to the Government; a capacity now large, organized and efficient because of its development through the European war at no cost to our Government. It takes from 18 months to 3 years to re-create that capacity when once destroyed—to increase the Government plants and assemble the organizations to operate them efficiently or to turn private industrial plants into munition factories.

"It appears to the board impossible to escape the conclusion that it is not desirable for the Government to undertake, unaided by private plants, to provide for its needs in arms, munitions, and equipment. Nor is it feasible or practicable to do so in any sense except in the restricted sense of a mere physical possibility."

With the exception of that located at Rock Island, the board finds all the Government arsenals to be badly located from the standpoint of security and of quick and convenient distribution of output. The Rock Island establishment is but half developed and is not up-to-date, but the board points out that it can easily be expanded and made a model plant.

War Expansion as Shown by Powder Company

Illustrating the extent to which private establishments have been developed by the European war, the board cites the experience of the DuPont Powder Com-

pany. The capacity of this concern up to October, 1914, was not to exceed 10,000,000 lb. per annum. In that month ground for extensions was broken and by January, 1915, the output reached 950,000 lb. per month; by April it was 3,000,000 lb. per month; by January, 1916, it was 20,000,000 lb. per month, and its present production is about 30,000,000 lb. per month, in addition to very large quantities of guncotton.

The only powder plant owned by the War Department, that at Picatinny, near Dover, N. J., has a capacity of 11,000 lb. per day. "One of our seacoast fortifications," the board declares, "could fire its daily production in a minute." The Picatinny plant is not well located for expansion, and the board says "the question presented for serious governmental consideration is how and to what extent shall the existing private plants—expanded to meet foreign demands—be kept alive and going, available to service should the need arise?"

The board calls attention to the fact that the great guns for seacoast defense, with their carriages and equipment, must be in place and ready for use with the necessary reserves of ammunition at the outbreak of any war that might occur. They cannot be left to be manufactured and put in place after the emergency arises. A very difficult problem is also presented in the manufacture of field artillery guns and carriages and the infantry rifle because of the time unavoidably consumed in their making. Taking the rifle as an illustration, the board says:

Gages, Jigs, Etc., Needed as for Rifles

"The Springfield rifle has more than a hundred parts and it requires more than 1,400 distinct factory operations to produce the finished piece. The experience of our most highly organized and best equipped plants in carrying out European orders for military rifles is a lesson that our own Government should take to heart. The board can only speak of the results of its observations and of the frank statements of the officers of these plants in general terms. So speaking, it may be said that the lack of correct specifications and drawings followed by the lack of correct gages, jigs, special fixtures and tools not merely caused delay in arriving at a satisfactory output, but caused a large wastage of time and labor upon unsatisfactory products.

"The plants that are now turning out foreign rifles after two years of hard work have not yet reached their expected capacities. To turn these private plants from the manufacture of European rifles to the manufacture of the Springfield rifle would, if undertaken to-day, require not less than 18 months to get first results and at least 2 years to get capacity output."

A like story can be told, the board says, concerning the production of field artillery, except that in the case of the larger guns a still longer time is required. The board feels that it cannot too strongly emphasize the alarming shortage of rifles and field artillery and the impossibility of filling this need in time of emergency.

The necessity for the immediate standardization of gages, dies, etc., on United States army models and the equipment of private plants therewith is very forcibly urged by the board. It suggests "these first indispensable things be taken up, standardized, produced and stored in such numbers as would enable an establishment upon receipt of its quota to set about at once with clear purpose to adapt its tools, machinery, etc., to the particular output called for. Perhaps this standardization and storage should be extended to the jigs and fixtures required for the production of at least the most difficult material."

Attitude of Private Makers Praised

The board pays a high tribute to the patriotic attitude of the private manufacturers of the country. "No feature of the board's experience," it says, "is more impressive than the attitude of private manufacturers to this whole question of preparedness. It is clear that the enormous difficulties they themselves have experienced in arriving at successful production, combined with the extraordinary size of the foreign demand, has sunk deep and made a lasting impression that the carrying on of modern war is a task of stupendous magnitude and of extreme difficulty from every angle. They are more than willing to co-operate; they are anxious

to do so, fully realizing that in successful co-operation with the Government lies the best if not the only certain chance of success.

"Apprehension has been expressed that Government contracts and a potential capacity to turn out war material might foster the growth of a class whose profitable interests would lie in war, and who, in consequence, might in time become a danger to the State. It is not the belief of this board that any such danger exists in our country. The number of plants and of persons concerned, when considered in reference to the whole country, the total of industrial plants and of people, is relatively too insignificant. We know the function of the leaven in respect to the mass; but we know, too, that the mass must be adapted to the particular leaven if anticipated results are to follow, and it is impossible to believe that we constitute a mass responsive to a leaven of warlike provocation and ready to belie our strongest characteristics by taking on, under the workings of an insidious few, the nature of a war-seeking people.

"But we find no ground for supposing private in-

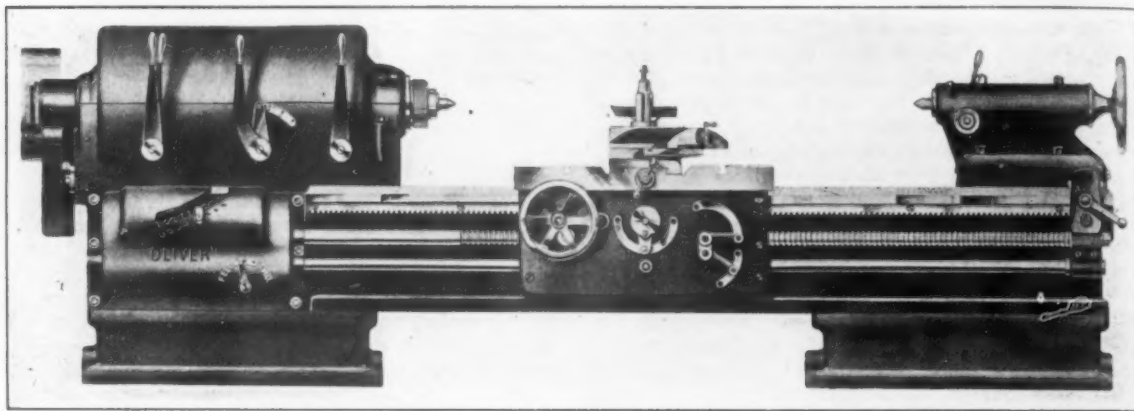
inaugurate and pursue some plan to utilize the exceptional opportunity now offered to achieve preparedness for war, we shall probably never achieve it adequately, and should war come upon us we would find ourselves facing a great national emergency, self-crippled against the hour of need."

W. L. C.

A 26-In. Heavy-Duty Engine Lathe

An extra heavy-duty engine lathe having a swing of 26 in. has been brought out by the Oliver Machinery Company, Grand Rapids, Mich. It is of the all-gear headstock type with a single-pulley drive through a belt connection to an electric motor or a countershaft. The construction of the lathe is heavy throughout, box section legs and reinforcing ribbing being used. A special arrangement of speed control levers is employed on the headstock and another feature is the 30-deg. angle of presentation of the tool holder slide.

The gears providing the 12 spindle speeds, ranging from 8 to 300 r.p.m., are of large pitch diameter and



Special Speed Control Levers and a 30-Deg. Presentation Angle of the Tool Holder Slide Are Among the Features Characterizing This 26-In. Heavy-Duty Engine Lathe

dustry co-operating with the Government in the manufacture of arms and ammunition would constitute such a leaven. On the contrary, we found the feeling prevalent that the outbreak of any hostilities would be the signal for the Government to take practical possession of such private plants as were prepared to manufacture arms and 'cut all of the profits out of war.' Indeed, the board could see no way in which they could hope to derive any benefits from war in which this country is involved. On the contrary, they all realized that their industries, in such event, would have to cease and their plants would be turned over to the Government upon whatever terms the Government chose to fix. Domestic peace, not war, offers them the occasion for profit.

"On the other hand, we cannot fail to realize that the danger of a national catastrophe through a lost war is a real danger which we have to provide against, and only through such co-operation with private industry can it be practically done."

The board closes its report with a severe condemnation of the present policy of the War Department in slowly accumulating a munition reserve, a policy that has been forced upon it by the niggardly appropriations of Congress. The board says:

"It seems to us the critical hour when our Government must decide upon some policy with respect to their co-operation or else witness the passing of a great opportunity. That this can be done the board believes; that it should be done seems both urgent and evident. The precise plan is not for this board to devise or suggest. It requires the careful study of bodies having a continuous life like the Congress, the War Department and the Council of National Defense. Whatever the plan, one thing is plainly indispensable, i. e., a continuous policy supported by continuous appropriations. Sporadic orders or intermittent efforts along the lines indicated will not only be costly but fatal in times of need. Moreover, should we fail to

are all inclosed and run in oil. The pinions are steel forgings and the gears are cast. The front spindle bearing is 6½ in. in diameter and 10 in. long, while the rear one is 4½ in. in diameter and 7 in. long. These bearings are of the two-piece replaceable bronze type and are adjustable for wear. The hole through the spindle is large enough to enable a 3-in. bar to pass through the headstock. The spindle nose is designed to enable the faceplate to be replaced easily. The bed is of the builder's standard box-type design and is supported by box column legs, eliminating overhang. The distance across the shears is 24¼ in. and the whole bed is braced by closely spaced box sections.

The carriage has a bearing of 40 in. on the shears and the bridge measures 12 in. over all. The carriage has two movements by hand, one by a regular feed handwheel, used when the carriage is in position to take a cut, and the other by a rapid motion crank which is employed for changing the position of the carriage on the bed. The 30-deg. angle of presentation of the tool holder slide, it is pointed out, gives a solid bearing for the tool and also permits of easy manipulation.

A quick-change gearbox provides 33 feeds ranging from 0.013 to 0.333 in. per revolution of the spindle, and the same number of threads ranging from 1 to 16 per in. The various feed rates and the different threads are obtained by changing the positions of the controlling levers, as indicated on the table on the gearbox.

The location of a blast furnace in an industrial center rather than near an ore field is advocated by a writer in *Echo des Mines* dealing with the future of the metallurgical establishments near the German frontier. Such a furnace, he holds, tends more and more to be a gas producer with pig iron as a by-product, producing a large surplus of power as gas, which cannot be used locally. And coal is becoming progressively dearer as a source of power in France.

Potash as a By-Product of Blast Furnaces

Its Commercial Recovery by the Bethlehem Steel Company—Results with the Cottrell Electric Dust Precipitator—Analyses and Yields

THE extent to which potash might be reclaimed as a profitable by-product in the manufacture of pig iron is thoroughly discussed by R. J. Wysor, superintendent blast furnaces, Bethlehem Steel Company, South Bethlehem, Pa., in a paper entitled "Potash as a By-Product from the Blast Furnace," to be presented at the February meeting in New York of the American Institute of Mining Engineers.

About four years ago, says the author, an analysis was made of the fine, yellowish fume of which a considerable quantity was removed from the bottom of the stove checker work. This was in the course of investigating blast-furnace stove efficiencies. The sample was found to contain about 15 per cent water-soluble potash, which was somewhat surprising. This induced an investigation which showed that considerable quantities of this material, hitherto a waste product, could be recovered from the stoves and gas-fired boiler settings.

A search for a market was made without immediate satisfactory results, one fertilizer dealer claiming that the alumina content was too high. Others wished to make practical tests and they were furnished with large samples for a full season's demonstration, satisfactory results being reported. But the pre-war-time prices offered hardly seem to justify reclaiming the dust. After the war started, however, and after the spectacular rise in the potash market, reclamation was immediately commenced, knowing just what dust to recover, and a satisfactory contract was negotiated. This company has been disposing of the dust at a good profit ever since.

The investigation covered by the paper embraces an inquiry as to the source of potash in the raw materials charged, the behavior in the furnace and the methods for recovering it as a by-product or of eliminating it as a nuisance.

Alkalies in Raw Materials

Potash doubtless occurs almost entirely in some form of feldspar or clay in all the materials entering the blast furnace. Taking the materials that enter the blast-furnace charges at the various furnaces of the Bethlehem Steel Company the author gives in table 1 analyses representing three months' shipments in 1916, including hundreds or thousands of carloads of each variety. Besides the alkali metals, percentages of alumina and silica are given as well as the iron content of the iron ores, all analyses being expressed on a natural basis.

Table 1—Analyses of Materials of Blast-Furnace Charge

	Source	Fe	SiO ₂	Al ₂ O ₃	K ₂ O	Na ₂ O
Iron Ores:						
Toto, magnetite.....	Chile	65.0	2.7	0.9	0.21	0.48
Juraria, magnetite.....	S. Coast Cuba	54.5	13.0	2.7	0.20	0.77
Mayari, limonite.....	N. Coast Cuba	38.0	2.0	10.0	0.06	0.25
Swedish, magnetite.....	Northern Sweden	66.0	2.8	1.1	0.27	0.82
Port Henry concentrates, magnetite.....	Northern New York	63.5	4.4	1.8	0.28	0.68
Harmony Cobbed, magnetite.....	Northern New York	63.0	10.0	3.4	0.25	0.55
Barton Hill, magnetite.....	Northern New York	64.0	8.3	1.9	0.22	0.77
Cheever, magnetite.....	Northern New York	59.5	11.4	1.0	0.21	0.92
Sterling, magnetite.....	Southern New York	55.0	8.6	2.0	0.23	0.95
Manganate, hematite.....	Lakes, Menominee	45.5	7.2	3.3	0.24	0.47
Norman, hematite.....	Lakes, Gogebie	55.5	5.4	1.5	0.29	0.32
Eureka, hematite.....	Lakes, Gogebie	54.5	7.1	1.6	0.26	0.35
Mary, hematite.....	Lakes, Marquette	50.5	7.5	2.5	0.23	0.55
Manganese Ores:						
Brazilian.....	Brazil	.....	7.5	3.0	0.88	0.21
Cuban.....	S. Coast Cuba	.....	.....	.....	1.12	0.77
Oriental.....	India	.....	.....	.....	1.68	0.19
Fuel:						
Lehigh byproduct coke.....	West Virginia Coals	.....	5.1	3.4	0.28	0.30
Flux:						
McAfee limestone.....	Northern New Jersey	.....	2.5	0.9	0.36	0.70
Average dolomite.....	Bethlehem Vicinity	.....	3.5	1.5	0.82	0.97

Two or three of the above ores are mixtures of magnetite and hematite, with the former predominating.

No striking relation was discovered except that the manganese ores from widely separated sources were found to contain relatively high percentages of potash as compared to most iron ores. Iron ores of this country, including those of the South, containing upward of 1 per cent potash or over, seem to be restricted to small areas. Per unit weight the potash content of the flux charge at Bethlehem is considerably higher than in either the average or coke charge. In the course of the investigation samples of slag and flue dust from all of the Bethlehem furnaces were collected continuously over a period of four weeks during June and July, 1916, and analyzed for the alkalies.

The percentages of potash in the ore mixture charged in each furnace vary between 0.27 and 0.29 per cent with the soda ranging between 0.43 and 0.63 per cent. The ratio of potash to soda is considerably higher in the coke than in the ore and limestone. The author deduces that for each ton of pig iron produced nearly 60 lb. of the alkali oxides are charged, constituents which certainly are of considerable importance in the working of the furnace, yet of which relatively little cognizance has been taken in the past.

Action of Alkalies Within the Furnace

It is probable that a considerable part of the potash and soda charged into a blast furnace is evolved from the top by direct volatilization or heat decomposition, though alteration by chemical reaction of the alkaline salts or compounds liberated may occur before they have left the furnace. It is certain that a large part of the alkalies is carried down into the hotter zones of the furnace and is converted into cyanides by reaction with red-hot carbon. Some investigators have attributed an appreciable part of their ore reduction to the action of cyanides, inferring that after being oxidized and driven to the cooler upper portion of the furnace, they condense and are again carried down into the reducing zone. Whatever the action it is self-evident that eventually the same amount of alkalies must be carried out of a furnace that is charged, and this takes place through the following avenues of escape:

1. In chemical combination in the slag.
2. As cyanide or other volatile or inflammable compound through the iron and cinder notches.
3. By liquid exudation or decomposition from gas around the tuyeres, coolers, mantel and cooling plates.
4. By combination with the brickwork or as an accretion in the form of cyanide, etc., and removal when the furnace is blown out.
5. By evolution in the gas.

As to the chemical combination of potash in the slag average samples from each of six furnaces in operation for two bi-weekly periods were carefully analyzed for both potash and soda. The slags were all normal in composition and showed an average for all furnaces for the first period of 0.38 per cent potash and of 0.53 per cent soda in the slag, the silicon content of the pig iron averaging 1.32 per cent; for the second period the average for all furnaces was 0.39 per cent potash, and 0.56 per cent soda with a silicon content in the pig iron of 1.29 per cent. The average ratio of potash to soda in the slag was 1 to 1.4.

On old blast-furnace slag dumps at Bethlehem, deposits of a yellowish or almost white substance frequently may be found in sheltered crevices or small grottoes into which water has percolated through overlying masses of slag, this becoming more or less charged with soluble salts. The substance left by evaporation may be in the form of stalactites, thin acicular crystals or of a dry powder. Considerable quantities of this material may be seen at Bethlehem where portions of the slag dump are being removed

for concreting and other work. Analyses of two representative samples, one light yellow and the other nearly pure white, showed a percentage of 8.66 of potash and 4.27 per cent of soda in the white and a percentage of 17.64 of potash and of 8.76 of soda in the yellow compound.

Lime As a Desulphurizing Agent

Commenting on the complete analyses of these substances given in the paper, the author calls attention to the apparent significance of the relatively large percentage of lime and sulphur and the absence of magnesia in the above leachings. "We know," he states, "that practically without exception magnesium salts are more soluble in water than the corresponding salts of calcium. Our flux at Bethlehem for years has consisted of half limestone and half dolomite; as previously stated, the magnesia content of the slags averages about 13 per cent. The above facts furnish new evidence, so far as can be ascertained, as to the superiority of lime over magnesia as a desulphurizing agent in the blast furnace."

Alkalies in Dry Dust Between Furnace and Washer

Besides the dust carried out by the relatively small amount of gas escaping from the furnace top, and the insignificant quantity permanently deposited along the mains, all the dust under the above heading is removed from the dust catcher. Representative bi-weekly samples of the dust-catcher flue dust were taken over the same period during which the slag samples were secured. Average results for all furnaces were as follows:

	TOTAL		WATER SOLUBLE	
	K ₂ O	Na ₂ O	K ₂ O	Na ₂ O
Average for all furnaces, first period.....	0.53	1.16	0.31	0.30
Average for all furnaces, second period.....	0.70	1.42	0.25	0.20
Average for all furnaces, both periods.....	0.61	1.29	0.28	0.25
Ratio average total potash to average total soda.....	1:2.1			
Ratio average water-sol. potash to average water-sol. soda.....	1:0.9			
Ratio average water-sol. potash to average total potash.....	1:2.2			
Ratio average water-sol. soda to average total soda.....	1:5.2			

Effect of Primary Washers on Alkalies in Dust

"At Bethlehem we have in service a type of tower spray washer, in common use in this country. All of the gas for stoves and boilers, as well as for gas engines, is washed, except from one furnace. Naturally, it would be thought that practically all of the alkaline material in the dust, most of it readily soluble in water, would be removed in the wet washers. The bulk of it is washed out, but it is a remarkable fact that much of the water-soluble alkalies remains in the gas current after leaving the washers. Calculations based on alkalies charged into the furnaces, lost in the slag, dust catcher, stack gases, etc., and recovered from the stoves and boiler settings, indicate that about 21 per cent of the total potash (apparently only about 5 per cent of the soda) entering the primary washers, passes through them. The explanation for this fact is that the particles of fume are in such an exceedingly fine state of division that they escape contact with the relatively large drops of water. In my opinion, any washer which will successfully clean blast-furnace gas rich in this fume must employ spray nozzles or other devices which will discharge water in a fine mist, thus insuring intimacy of contact between dust and water particles. Our washers at present perform the function of selective precipitation, eliminating the relatively coarse and heavy iron ore and coke particles, while delivering the lighter particles of dust and fume into the primary clean gas main.

The water-soluble potash content of the dry, ignited dust, recovered from the stoves and boilers, having previously passed through the wet washers, will vary from about 5 to 20 per cent. Our practice has been to store the material in a large bin, capable of holding two or three carloads. The commercial recovery, begun in 1914, was not thoroughly systematized until the ensuing spring. The weights and water-soluble potash contents, calculated on the dry basis of 36 carloads of alkaline dust shipped in the period of 15

months, April 1, 1915, to July 1, 1916, were as follows:

Total weight of carloads.....	1073.5	net tons
Total weight of water-soluble potash.....	106.3	net tons
Average percentage of water-soluble potash per car.....	9.90	per cent

This represents all the dust removed from stoves and boilers serving four 500-ton furnaces, which could be recovered in normal operation, without special effort. Instead of being dumped into a dirt car, the dust was simply emptied into a central bin. A number of other carloads of lower-grade material, contaminated by flue dust from unwashed gas, were also shipped from the other furnaces, but are not included in this tabulation.

Complete analyses of three typical carload samples and one especially rich stove-dust sample, containing approximately 20 per cent water-soluble potash, are given in table 2.

Table 2—Analyses of Typical Carload Samples and a Rich Stove-Dust Sample

Ingredients	No. 1 Per Cent	No. 2 Per Cent	No. 3 Per Cent	No. 4 Per Cent
SiO ₂	22.22	18.07	18.50	22.66
FeO.....	15.24	11.25	2.31	2.30
MnO.....	0.67	0.67	0.75	0.79
Al ₂ O ₃	11.58	11.04	11.22	11.60
TiO ₂	0.06	0.05	Trace	Trace
CaO.....	11.69	12.22	13.14	12.49
MgO.....	7.35	8.49	12.35	6.76
ZnO.....	2.57	0.82	4.29	2.04
C.....	5.04	5.43	0.50	0.40
SO ₂	6.35	6.13	7.60	10.80
CO ₂	1.61	1.94	2.40	0.58
Cl.....	3.34	5.29	5.40	4.86
CN.....	None	None	None	None
CNO.....	None	None	None	None
CNS.....	None	None	None	None
NH ₃	None	None	None	None
Total K ₂ O.....	10.87	14.40	16.94	19.71
Total Na ₂ O.....	3.74	7.30	7.06	7.34
Water-soluble K ₂ O.....	7.55	12.00	15.92	17.04
Water-soluble Na ₂ O.....	3.28	3.94	4.44	3.98
Ratio water-soluble to total K ₂ O.....	0.69	0.83	0.94	0.86
Ratio water-soluble to total Na ₂ O.....	0.88	0.54	0.63	0.54
Ratio total K ₂ O to total Na ₂ O.....	1:0.35	1:0.51	1:0.42	1:0.37

Calculating on the basis of pig iron produced in the above 15-month period, the alkalies recovered in terms of total charged are as follows:

	Per Ton Pig. Pounds	Per Cent of Total Charged
Total potash recovered in fertilizer material.....	0.3	1.3
Total soda recovered in fertilizer material.....	0.1	0.3

The amount of potash recovered, though of considerable tonnage and value, is an insignificant percentage of the total charged.

At furnace plants using burdens rich in potash where the gas is unwashed, a considerable recovery still can be effected, though some precautions must be taken to avoid the coarser, raw flue dust. Several other furnace plants in the East, acting upon our suggestion, made directly or indirectly, have been recovering potash-bearing flue dust during the last year and a half.

Methods for Further Recovery of Potash

In our present gas-cleaning practice, it appears that there is a loss in the primary washers alone of over half of the total potash charged, or about 12 lb. per ton of pig iron produced, though, as mentioned later, this amount is probably a little high. The amount recovered, while appreciable, and representing almost clear profit, is seen to be an insignificant part of the total, less than 1/2 per cent. Potash lost in the slag, around the shell and from the top of the furnace, for all practical purposes, is lost beyond recovery. The greater part of the alkali content of the flue dust removed from the dust catchers could be recovered by leaching in water, but the percentage is too low to justify reclamation in this way. However, the potash now lost in wet washers and from stove and boiler-house stacks offers a legitimate and inviting field for its recovery. According to our balance sheet, it appears that about two-thirds of the total potash charged is now lost in the wash water and stack gases, or about 15 lb. per ton of pig iron produced.

About two years ago we obtained estimates for cost

of recovery of the flue dust from several of our large boilerhouse stacks, both by filtering and electrical precipitation methods; but the relatively high cost and the uncertainty in the potash market, deterred an actual installation. Later it was realized that the principal loss of potash was not from the stacks.

At intervals during the course of the last year or more, we have had in operation an experimental Cottrell electric dust precipitator, connected to the raw gas main leaving one of the dust catchers. It is not my purpose in this paper to discuss the operation of the unit, except to state that practically all the dust and fume entering the treater could be precipitated successfully. The color of the dust recovered varied from a light to a dark gray. Several samples were analyzed and showed a potash content of about 10 per cent. The total dust leaving the dust catcher is evidently very much richer in potash than the relatively heavy particles constituting the dust in the dust catchers. However, with the above knowledge at hand, and judging from check calculations on total dust leaving the dust catchers and its theoretical potash content (by difference), it is my opinion that the estimated weight (by difference) of potash lost in the primary washers is somewhat, though not greatly, too high. For our average practice, there should be not less than 12 lb. of total, and probably about 9 lb. of water-soluble potash, now lost in washers and stacks, per ton of pig iron produced.

It may be mentioned that by weak acid treatment part of the insoluble potash content in flue dust may be rendered water-soluble, though this is not likely to be of practical application. Also, the soluble alkali salts can be recovered in tolerably pure form by leaching and evaporation.

It is not my purpose to develop at length the commercial phase of the subject. With the foregoing figures and present potash-fertilizer value as a basis, anyone can readily determine what a very attractive proposition is the recovery of potash from blast-furnace gas at the present time. A word of caution may be appropriate. As previously indicated, the weight of potash charged per unit of iron produced is above the average at Bethlehem. There are only two or three apparently practical methods for recovery on a large scale of potash from blast-furnace gas, and they are expensive and as yet untried for blast-furnace conditions. The price of potash is certain to fall after the war.

On the other hand, the recovery of potash in connection with the thorough dry cleaning of blast-furnace gas, with certain obvious advantages as against wet cleaning, is an attractive proposition to plants now suffering from burdens rich in alkalies. I venture to predict that in the future dry cleaning will be adopted in many blast-furnace plants, and that many thousands of tons of potash, hitherto wasted, will be reclaimed. Thus will our national resources be strengthened in this important raw material, and the blast-furnace will have added another material to its increasing list of by-products.

British Government Confiscates Copper Scrap

All unwrought copper scrap and swarf is confiscated by the British Minister of Munitions except when due under contract or for conversion into refined metal or for use in the works of buyer or when specially accepted by written authority, says a cablegram of Jan. 3 from the American consul general at London. All smelters and refiners are required to furnish monthly returns of stock to the Minister of Munitions.

British Imports of Manganese Ore

Manganese ore imports into Great Britain in November, 1916, were 32,850 gross tons, as compared with 38,360 tons in October and 42,389 tons in September. The total to Dec. 1 was 419,604 tons against 338,053 tons to Dec. 1, 1915. Imports of manganese ore to the United States for the first 10 months of 1916 were 495,300 gross tons, exceeding the British imports for 11 months—an unprecedented record.

CORROSION OF IRON SHEETS

Effect of Alloying Cobalt, Nickel or Copper with Ingot Iron

The question of the corrosion of iron and steel has come before another technical society. At the ninth annual meeting of the American Institute of Chemical Engineers in New York, Jan. 10, 1917, Herbert T. Kalmus and K. B. Blake presented a paper entitled "Corrosion of Ingot Iron Containing Cobalt, Nickel or Copper."

The paper is extensive and deals with the details of an investigation into the effect of adding various percentages of cobalt, nickel or copper to pure ingot iron as made by the American Rolling Mill Company, Middletown, Ohio. The additions were made in small quantities to ingot iron melted in crucibles in a small electric furnace, and all the tests were on a small and not a commercial scale. The castings were from 4 to 6 in. long and about 1¼ in. in diameter. To obtain samples for corrosion tests, these bars were turned into discs and when satisfactory the discs were annealed by heating them at 780 deg. C. for two hours and allowing them to cool with the furnace for six hours. After turning off a skin to get rid of the outside layer, the disc was finished to a smooth surface in a lathe, the finishing chips being kept for analyses for carbon. The discs were then carefully polished on the buffing lathe and measured for exposure.

Of the 11 general conclusions the following may be cited as indicating the results:

The alloys formed by the addition of small percentages of copper, nickel and cobalt (from 0.25 to 3 per cent) to American ingot iron, are more resistant to atmospheric corrosion than the pure American ingot iron, from which the alloys were prepared.

The addition of copper to American ingot iron to an extent between 0.25 and 0.75 per cent seems to be conducive to reducing the corrosion of American ingot iron under atmospheric conditions. It is difficult to say whether or not the addition of copper in these amounts has a greater or lesser effect than the corresponding amounts of nickel or cobalt. Additional experiments will be required to determine these facts, but there can be but little doubt that the addition of copper, as above reported, diminishes the corrosion of the pure American ingot iron.

Dr. Allerton S. Cushman, in discussing the paper, severely reflected on the technical and scientific value of the results presented. In extended remarks he emphasized the complexity of the subject of corrosion, stating that he had appeared now before nearly every important technical organization in the country to present his side of the question and to combat just such inconclusive results as these.

He insisted that experiments, no matter how exhaustive, if conducted on such a small scale, were almost valueless as offering definite data of a scientific or commercial nature, especially in connection with such a subject as the corrosion of sheets. He referred to his own tests on a large scale of full sized sheets of all kinds, many of which would not rust fast enough so as to enable a satisfactory report to be made, also to the extensive investigations by the American Society for Testing Materials. In some cases cobalt and nickel sheet iron, made in large heats, had already failed, though for a time he had been hopeful of good results. In any event, from an economic standpoint the benefit derivable from cobalt or nickel would have to be very decided owing to the cost of incorporating such elements in steel or iron, with nickel at \$60 per ton and cobalt at \$1.50 per pound. Conclusions based on such small tests he considered an injustice to consumer and producer.

At the same session and previous to the presentation of the foregoing paper, the question came up of the ethics of allowing a paper to be printed and presented under the authority of a society, in which sweeping conclusions, possibly detrimental, are associated with the name of a particular company's product. The matter was referred to the institute's committee on ethics.

Progress in Hot-Blast Stove Design*

Question of Brick Sizes, Shape and Spacing— The Combustion Chamber—Blast Temperatures—Two, Three and Four-Pass Stoves

BY ARTHUR J. BOYNTON

FURNACE operators are confronted with a problem in connection with the use of hot blast similar to that which engaged the attention of the iron masters of England and Scotland in the years when the blast was heated in stoves fired by solid fuel. The fuel so used had to be added to that charged into the furnace, and remained a debit against the advantage gained by the use of hot blast. Even under these conditions the early records tell of a net saving of 1000 lb. of coal per ton of iron and from that day to this not only the economy but the practical necessity of hot blast, excepting for charcoal practice, has not been seriously questioned.

After the advent of the closed top, which permitted the use of furnace gas in the stoves, and up to the recent period of electrification of steel works and mills,

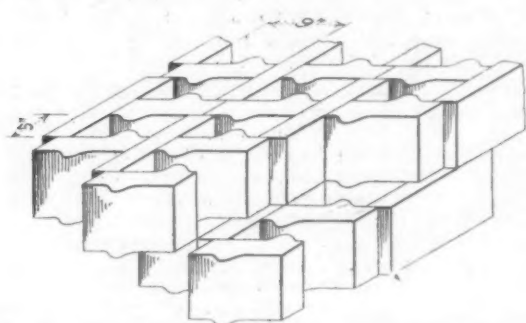


Fig. 1—Corrugated and Side Checker Brick and Method of Laying as Used at Joliet Works of Illinois Steel Company

the hot-blast saving, in terms of fuel charged into the furnace, was all saving. The gas supply was normally abundant for all the furnace plant uses, the temperature of blast which could then be used was generally not high, and the subject of stove design attracted comparatively little attention.

During the past five years changes chiefly in furnace lines and furnace fuel have made the use of increased blast temperatures extremely advantageous from the standpoint of coke practice, while the demand for gas for power purposes has again required that extreme economy be practiced in the use of fuel in the stoves. There has been no general argument as to the advisability of limiting hot-blast temperatures for the sake of making the gas available for power purposes, but rather a disposition to make use of the highest temperatures with which it is possible for the furnace to work, and to increase the size of the stove equipment, primarily for this purpose, but also with a careful regard for economy in the use of gas. Under the existing conditions it has been possible in many cases, not only to increase the blast temperatures 300 or 400 deg. with no additional gas consumption, but actually to produce these higher temperatures with less gas than formerly required for the moderate temperatures then in use.

It is the purpose of this paper to give an account of the generally accepted principles of recent stove construction, and to describe and compare some recently built stove installations.

The modern stove is a development of the last five years. The standard equipment of 1910 was a set of four stoves, built with 9-in. checker openings and 3-in. walls, or larger openings and thicker walls where radial checkers were used, containing an average heating sur-

face of about 175,000 sq. ft. for furnaces 21½ ft. in the bosh and larger, with a range of from 150,000 to 200,000 sq. ft.

A considerable part of this surface was ordinarily ineffective on account of plugged checkers and cinder burnt on the bricks. The combustion of the gas was haphazard, chiefly because a burner which gave some possibility of control gave also a flame which filled the combustion chamber and the tops of the checkers with cinder. The gas was therefore purposely burned with a long flame and its temperature kept down.

Under these conditions few stoves developed over 1000 deg. of blast temperature, and those which exceeded this temperature did so at the expense of stack gases in some cases hotter than the blast. The efficiency of such stoves was considerably below 50 per cent.

In addition to low blast temperatures and the wasteful use of fuel in the stoves, the conditions referred to were most unsatisfactory from the standpoint of regular furnace practice. With a furnace which could profitably use all the heat which such a set of stoves could transmit to the blast, the operator was continually perfecting an equilibrium between burden and blast temperature as stoves came off for cleaning and went into service again, while the lack of surplus heat to correct irregularities showed in off iron, and occasionally decreased tonnage. Not the least difficulty was the necessity of working men inside the stoves under conditions which were exhausting and unhealthy.

The development which is rapidly changing those conditions was made possible by the introduction of washed gas. Without this improvement, the only change which could be made was an increase in the size, that is, in the outside dimensions of the stoves, or in the number of stoves per furnace. All argument as to the desirability of such development has been cut off by the evidently much more advantageous arrangement possible with clean gas, which, in the case of existing plants, reduced stove improvement to a relining proposition.

Primary Requirement in Hot-Blast Stoves

The primary requirement of the hot-blast stove is rapidity of heat transfer between the gas or air and the brick, since upon this rate of heat exchange depends the size of the stove installation.

During the cooling phase of operation, the stove must heat a given quantity of air per unit of time to a definite temperature. When this is no longer possible the cooling phase should end. The rapidity with which the heat can be disengaged from the brick is therefore the measure of the amount of effective brick-work necessary for a certain duration of the cooling phase, or in other words, with any given construction, a measure of the size of the stove. The necessary number of stoves depends upon the relation between the time required to heat and that required to cool, or upon the practicable rate of heating.

Since the transfer of heat takes place by conduction, and since the conductivity of heat through firebrick is very slow, it is of first importance to place the average mass of the firebrick as close to a heating surface as possible. This means, practically, that the checker walls should be as thin as structural strength will permit. With any given thickness of checker wall a decrease in the diameter of the checker opening gives additional brick within a given space, and also an increase in the heating surface.

The relations with regard to heating surface, volume of brick and percentages of free area for square check-

*From a paper read before the American Iron and Steel Institute, St. Louis meeting. The author is superintendent of blast furnaces of the National Tube Company at Lorain, Ohio.

ers of various sizes are shown in the accompanying table.

From this it appears that the greatest possible heating surface and volume of brick are obtained with the thinnest possible wall and a diameter of checker opening equal to the thickness of the brick. It is also apparent that with a checker diameter of $3\frac{1}{2}$ in. and a thickness of wall of 2 in., there is an increase in the volume of brick within a given space of 35.8 per cent and an increase of heating surface of 85.1 per cent as compared with the standard 9-in. openings and 3-in. walls. These dimensions have been applied to stoves in successful use to-day, and represent the advantage gained up to the present time by the use of washed gas.

The accepted practice is that the checker openings should be as small and the walls as thin as possible. For two pass stoves, the choice is now practically confined to 2 or $2\frac{1}{2}$ -in. brick, and to diameters of openings from $3\frac{1}{2}$ to $5\frac{1}{2}$ in., each designer going as far as his conservatism will permit. With these small checkers, the relatively great effect on the area of the openings of a slight movement of the brick, due to expansion and contraction, is the determining factor in deciding the limits of the construction.

The rate of heat transfer is also dependent upon the motion of the gas or air stream within itself. The ideal condition would be that every particle of gas in the checker should come in contact with the brick at each level in the checker, or, in other words that all the gas should come in contact with all the brick. This condition is manifestly impossible, but the closest possible approximation to it will lead to the best heat transfer, and the determination of the practicable limit is an important matter upon which so far very little action has been taken.

This principle lay at the bottom of the so-called Pfosser-Strack-Strumm system of burning gas, which consisted of practically doubling the consumption of gas in the stoves, and reducing their number, with no increase in stack temperature. Experiments upon our already hard-driven American stoves of the old type showed the possibility of increasing the rate of heat transfer, but at a very marked loss in efficiency. It seems probable, however, that a proper size of pass and ratio of length to size will permit a considerable

velocity through the checkers, and added still further to the friction. The reduction in the size of the checkers, which reduces the inner motion necessary to bring the gas in contact with the brick may very probably be a still further aid to heat transfer. The generally accepted laws of fluid friction state that friction is proportional to the surface, and increases with the velocity, but at a more rapid rate than the increase in velocity. It would seem therefore that all the recent changes in the direction of smaller checkers, have promoted heat transfer in some degree, aside from the increase in heating surface attendant upon their use. There is as yet however no tendency to complicate stove construction with the definite object of promoting inner motion of the gas or air.

Checker Construction

Square checkers are practically always used for two-pass side combustion stoves. The radial checker has been applied to some recent stove construction but is less economical of space than the square checker on account of the impossibility of maintaining the minimum practicable opening.

The corrugated checker has been applied to some

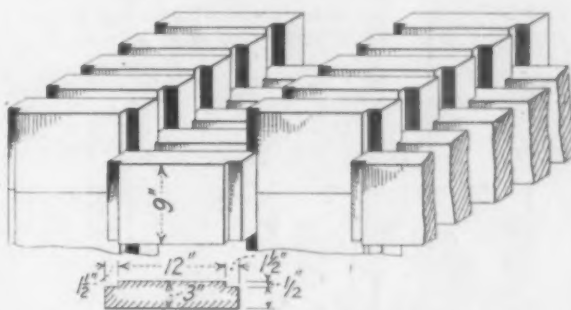


Fig. 2—Checker Brick and Method of Laying Proposed by Julian Kennedy

recent construction. This arrangement corrugates the brick running in one direction in an otherwise square or rectangular construction the proportions of which may be varied. As applied to a recently built installation this construction is shown in Fig. 1. Built

Exhibit of Square Feet of Heating Surface Per Cubic Foot Space, Cubic Feet of Brick Work Per Cubic Foot Space and Square Feet of Heating Surface Per Cubic Foot Brick for Different Thicknesses of Walls and Diameters of Openings in Square Checker Work

	Thickness of Walls, In.	Diameters of Square Checker Openings, In.									
		1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	$5\frac{1}{2}$	6
Square feet surface per cubic foot space...	1	12.000	11.520	10.667	9.796	9.000	8.296	7.680	7.141	6.667	6.248
Cubic feet brick per cubic foot space.....	1	0.750	0.640	0.556	0.490	0.438	0.395	0.360	0.331	0.306	0.284
Square feet surface per cubic foot brick....	1	16.000	18.000	19.185	19.992	20.548	21.003	21.333	21.574	21.788	22.000
Percentage of free area.....	1	25.00	36.00	44.44	51.02	56.25	60.49	64.00	66.94	69.44	71.60
Square feet surface per cubic foot space...	$1\frac{1}{2}$	7.680	8.000	7.431	7.507	7.142	6.717	6.347	6.000	5.680	5.388
Cubic feet brick per cubic foot space.....	$1\frac{1}{2}$	0.840	0.750	0.638	0.610	0.556	0.510	0.471	0.438	0.408	0.383
Square feet surface per cubic foot brick....	$1\frac{1}{2}$	9.143	10.667	11.647	12.306	12.845	13.171	13.476	13.699	13.922	14.068
Percentage of free area.....	$1\frac{1}{2}$	16.00	25.00	32.65	39.06	44.44	49.000	52.89	56.25	59.17	61.73
Square feet surface per cubic foot space...	2	5.333	5.877	6.000	5.926	5.760	5.553	5.333	5.113	4.898	4.692
Cubic feet brick per cubic foot space.....	2	0.888	0.816	0.750	0.691	0.640	0.595	0.556	0.521	0.490	0.462
Square feet surface per cubic foot brick....	2	6.006	7.202	8.000	8.576	9.000	9.333	9.592	9.812	10.000	10.158
Percentage of free area.....	2	11.11	18.36	25.00	30.86	36.00	40.49	44.44	47.93	51.02	53.78
Square feet surface per cubic foot space...	$2\frac{1}{2}$	3.918	4.500	4.741	4.800	4.760	4.667	4.544	4.408	4.267	4.125
Cubic feet brick per cubic foot space.....	$2\frac{1}{2}$	0.918	0.859	0.803	0.750	0.702	0.660	0.621	0.587	0.556	0.527
Square feet surface per cubic foot brick....	$2\frac{1}{2}$	4.268	5.239	5.904	6.400	6.781	7.071	7.317	7.509	7.674	7.827
Percentage of free area.....	$2\frac{1}{2}$	8.16	14.06	19.75	25.00	29.75	34.03	39.87	41.33	44.44	47.26
Square feet surface per cubic foot space...	3	3.000	3.555	3.840	3.967	4.000	3.976	3.918	3.840	3.750	3.654
Cubic feet brick per cubic foot space.....	3	0.937	0.889	0.840	0.777	0.750	0.710	0.674	0.640	0.609	0.581
Square feet surface per cubic foot brick....	3	3.202	4.000	4.571	5.106	5.333	5.600	5.813	6.000	6.158	6.289
Percentage of free area.....	3	6.25	11.11	16.00	20.56	25.00	28.99	32.65	36.00	39.06	41.87

increase in the heat exchange of the stove with but little loss of efficiency.

The progress of recent stove construction has been attended by some changes which have tended to increase the movement of the gas or air upon itself, although these changes have been generally incidental to an increase in heating surface rather than the result of deliberate design. The increase in surface has increased friction, and the lessening in area of the checker pass, due to making the checker diameter more nearly equal to the thickness of the brick, has increased the

to these dimensions the relations of surface, free area, and brick in unit volume are as follows:

	Straight Wall	Corrugated Wall
Square feet surface per cubic foot space...	3.5	3.906
Cubic feet brick per cubic foot space....	0.531	0.594
Square feet surface per cubic foot brick....	6.59	6.58
Percentage of free area.....	46.83	40.63

The increase in heating surface due to the corrugations as compared with rectangular construction of the same dimensions is 11.16 per cent. The square feet of

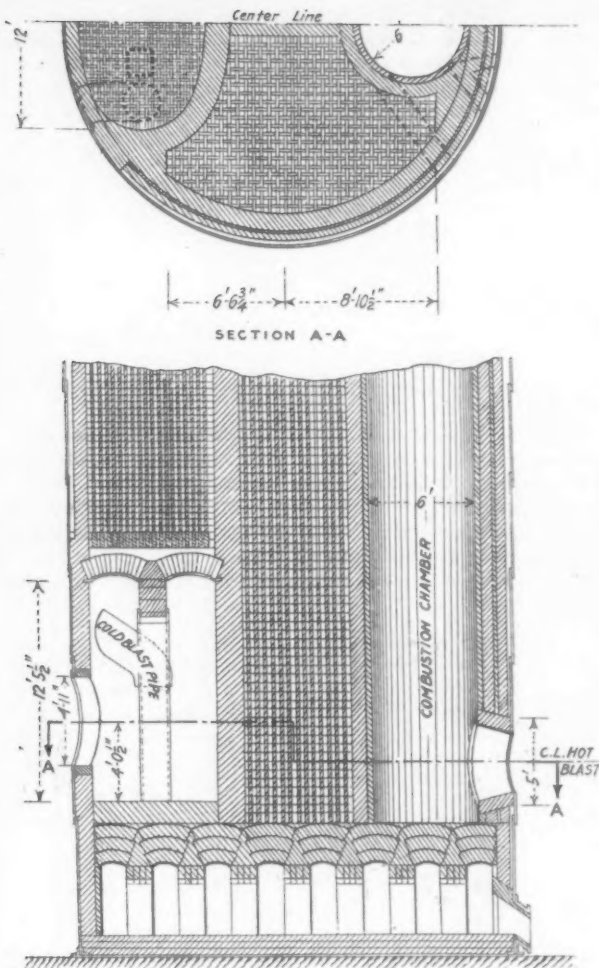


Fig. 3—Four-Pass Stove at Joliet

heating surface per unit of space corresponds closely to that obtained with 3-in. walls and 4-in. openings, or with 2½-in. walls and 6-in. openings.

These three forms of checkers, square, radial and corrugated, are the ones usually employed, with the square checkers in use in the great majority of cases, and apparently gaining in favor.

A checker which has been proposed by Mr. Julian Kennedy but not as yet installed is shown in Fig. 2. The relations for surface, area and volume are as follows:

Square feet heating surface per cubic foot of space.....	4.977
Cubic feet brick per cubic foot space.....	0.644
Square feet heating surface per cubic foot brick.....	7.728
Percentage of free area.....	35.6

The square feet of heating surface per unit of space with this construction corresponds closely to that obtained with 2-in. walls and 4½-in. openings.

An expedient for increasing the heating surface in stoves having 3 x 9-in. square checkers has recently been successfully tried at the Lorain works, of the National Tube Company. This consisted in placing inside the existing checker openings pointed tile extending diagonally. These tile were lowered from the top, the first one resting at the ends on the bearing tile at the bottom, so that when the job was completed three cornered checker openings resulted, the increase in heating surface being about 40 per cent. It is probable, however, that few of the older installations are in condition to permit the successful use of this device.

Distribution of Air and Gas in the Checkers

The remarkable series of stove tests made by A. E. Maccoun and described in his paper on "Blast Furnace Advancement" read before the American Iron and Steel Institute in May, 1915, indicate a distribution of gas and of air in the checkers of a two-pass stove which is far from correct. The inequalities which he found were apparently due chiefly to a lack of symmetry in the top and bottom of the stove. While these tests attracted much interest and showed the fallacy of

considering the distribution correct on account of an apparently even temperature at the top of the stove, they have not led to any marked change in the design of two-pass stoves, on account of the mechanical difficulties involved. They show, however, the possibility of very great improvement by a construction which will equalize the flow of air and gas throughout a stove.

Frictional resistance in the checkers themselves is probably the most effective aid to this distribution. In addition to this force, according to the generally accepted idea, the buoyancy of the gas and air in the checker exercises an equalizing effect where the gas is heated in a downward and the air in an upward pass. Under conditions of natural draft in a two-pass stove we have the weight of a column of air of the height of the stack plus the weight of the gas in the checkers opposing the weight of the gas in the combustion chamber plus the weight of the gas in the stack. Consequently the total force tending to drive gas through a cold checker is greater than that operating through a hot one, with a resultant tendency to equalize the temperature of all the checkers.

Conversely in the cooling phase of stove operation, the weight of air in the checkers resists the force of the blast. The hotter the air in any given checker, the less this resistance, and the greater the quantity of air which will be forced through it, the tendency being again to equal the temperature in the various checkers. Where the checkers are heated by an upward current and cooled by a downward flow, the hot checker tends to become hotter and the cold one colder.

The calculated difference in weight of gas due to an assumed average difference in temperature of 50 deg. Fahr. corresponds to a difference in pressure of less than 0.02 in. of water for a stove 100 ft. high, while the total drop in pressure through the checkers of a two-pass stove is an inch of water or more. The importance of buoyancy as determining distribution in the small upward passes of three and four-pass stoves, as built, is probably very small, but its action forms one of the arguments in favor of the two-pass stove.

A few years ago several two-pass stoves were built in which the checkers in the center of the pass were made smaller than those on the outside, the intention

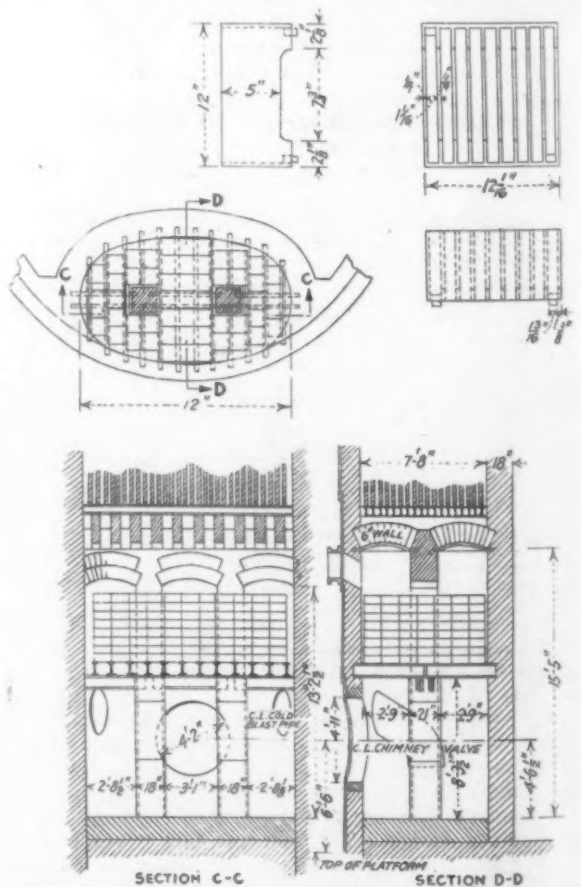


Fig. 4—Cast-Iron Checker Plate in Bottom of Fourth Pass of Joliet Stove

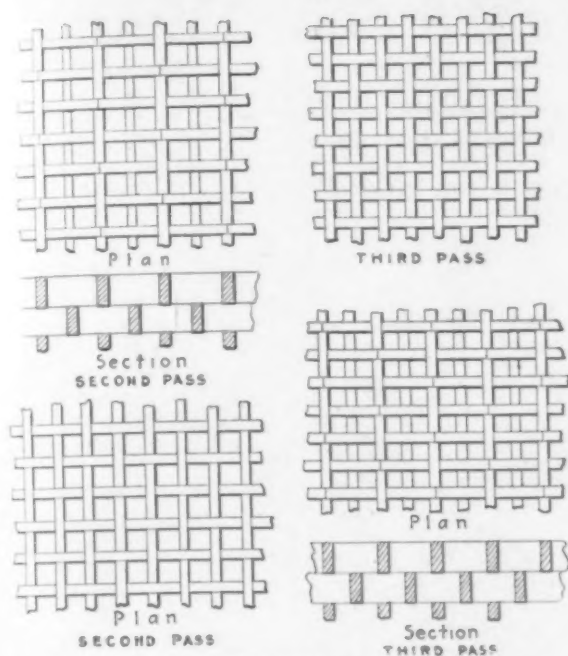


Fig. 5—Checker Details of Joliet Four-Pass Stove

Top 12 ft. of second pass has double checker work; checkers, $11 \times 4\frac{1}{2}$ in.; bricks $11 \times 6 \times 2$ in. and $12 \times 6 \times 2$ in. Remainder of second pass has $4\frac{1}{2} \times 4\frac{1}{2}$ -in. checkers and $11 \times 6 \times 2$ -in. bricks.

Third pass in general has $3\frac{1}{2} \times 3\frac{1}{2}$ -in. checkers and $9 \times 6 \times 2$ -in. bricks.

Bottom 12 ft. of third pass has double checker work; checkers, $9 \times 3\frac{1}{2}$ in.; bricks $9 \times 6 \times 2$ in. and $10 \times 6 \times 2$ in.

being to increase the friction in what was assumed to be the hottest part of the stove, and so to equalize distribution. This feature has not appeared in more recently built two-pass stoves, the positive advantage of building the checkers to minimum dimensions outweighing the possible improvement in distribution. Recent practice is to make all checker openings and walls to uniform dimensions throughout a given pass in square construction and in radial construction to come as near to this as practicable.

Recent construction provides a generally symmetrical outlet for gas and inlet for air, by a central chamber at the bottom of the stove, with outside connections either through the side of the stove, as built by the Illinois Steel Company, or through the stove bottom, as built by the Carnegie Company at the Duquesne Works.

The determination of the influence of the gas currents in the dome of the stove as influencing distribution is a difficult matter under high temperature conditions of actual service. Experiments have been made by A. N. Diehl in connection with the stove previously referred to which with an induced flow of cold air showed a maximum flow through the outer ring of radial checkers, the minimum flow being just outside the ring of checkers next the central combustion chambers with an increase in flow through this inner ring. An inclined baffle wall placed outside the checkers next the outer wall of the stove largely corrected this inequality under the same conditions of observation. The apparent conclusion from these experiments is that the gas current issuing from the combustion chamber continues upward and is deflected outward and downward by the dome. The same conclusion may be derived from Mr. Maccoun's experiments.

An exactly contrary view has been taken by other designers, whose object has been to prevent an unduly large flow of gas down the checkers next the combustion chamber. For this purpose the combustion chamber walls have been raised, both in center combustion and side combustion stoves. The wall is usually of a uniform height, but is sometimes varied. The newer two-pass stoves of the South Works of the Illinois Steel Company have a fan-shaped top to the combustion chamber wall reaching a height of $2\frac{1}{2}$ ft. at the middle of the wall. These changes to the height of walls have been made as a result of observation of apparent differences in temperature at the top of the

stove. Bearing in mind that gas and air are discontinuous bodies, and that all movement of one as well as of the other is the result of pressure, it is difficult to account for a marked tendency for gas to be forced down the checkers next the combustion chamber in undue proportion.

Variety in the Design of Stoves

Recent developments have brought only one actual construction of what may fairly be called a new type of stove, the new four-pass stove at Joliet. This stove is shown in Figs. 3, 4 and 5. Fig. 3 shows general vertical and horizontal cross-sections through the stove. Fig. 4 details of construction in the fourth pass, illustrating particularly the method of starting the small checkers of this pass, and Fig. 5 shows details of checker work in the three checker passes together with the peculiar method of laying checkers at the top of the second and bottom of the third pass, which is employed for the sake of distribution of gas. Fig. 6 shows the general arrangement of the pressure burner employed. Three stoves per furnace are provided.

(To Be Continued)

The Lincoln Electric Company, Cleveland, Ohio, held its annual sales convention Jan. 5 and 6 at which 50 of its district representatives and sales agents were present. Policies for next year were discussed and plans were worked out for close co-operation with users of electric motors. The convention closed with a banquet at the Hotel Statler.

The Central Steel Company, Massillon, Ohio, confirms the report that it has started the erection of two additional 75-ton open-hearth furnaces. On their completion, however, the company will have nine open-hearth furnaces of that capacity and not seven, as incorrectly printed in THE IRON AGE of Dec. 28.

The American Society of Mechanical Engineers' boiler code will soon govern in the State of Ohio, the Ohio Board of Boiler Rules, through the Industrial Commission of the State, having officially announced that the code will replace the Ohio code on April 1.

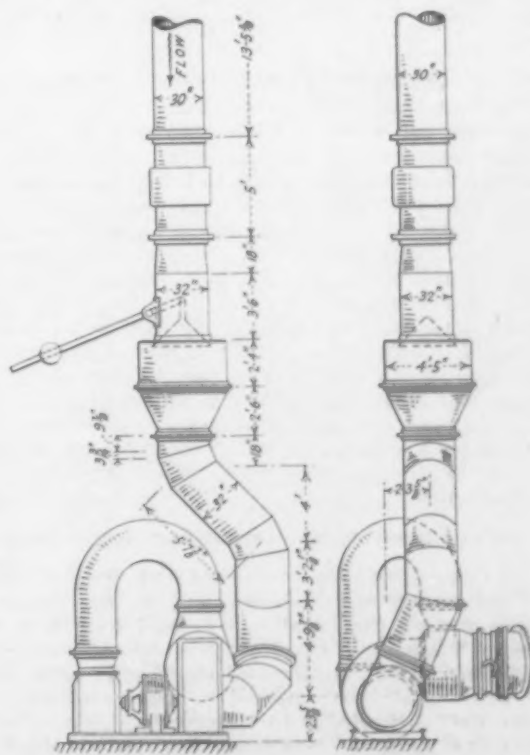


Fig. 6—General Arrangement and Details of Booster Fan and Piping for Gas Burner of Hot-Blast Stove

Obtaining Appraisals by a Short Method

Law of Averages Counterbalances Errors in Lump Valuations of Plants and Equip- ment — Method Reduces Time and Cost

"MY main object," said John G. Morse, in a paper read before the American Society of Mechanical Engineers, New York, Dec. 7, "is to show the uselessness of detail. I have found in appraisals that the law of averages will counterbalance all errors." Mr. Morse's paper, in part, follows:

It is a method based entirely on the theory that if the larger factors are carefully appraised, the less important items may be estimated in groups.

The property to be appraised is divided into two parts—buildings and machinery. The buildings are considered as empty structures. All elevators, piping, wiring and indeed anything that can be removed without altering the building, are classed under machinery. Attention might be called to the fact that in insurance appraisals, foundations and other underground work are ignored, but the method would be practically the same were they included.

Machinery is divided into machines proper, shafting, belting, piping, electric wiring and furniture and miscellaneous apparatus. Special small tools, dies, patterns, drawings, moulds, lasts and any objects of similar nature that exist in large quantities in the plant under consideration, are treated independently. The subject "miscellaneous apparatus," covers all objects of minor value not easily classified under any of the other heads.

The price values used for buildings and all the subdivisions of machinery are based on replacing new at to-day's market (regardless of original cost) and these price values are then depreciated as judgment dictates.

Buildings

In appraising buildings we use the square foot of floor area as a basis. Many architects and engineers use a factor based on the cubic foot of contents, but it is floor area that gives manufacturing facility, and the figures thus obtained are also useful in other parts of the appraisal, as will be shown later. As a ground-work we use the tables prepared by Charles T. Main.

Machines

It is our custom to make a complete inventory of all fixed machines, not only producing machines but also those used for power and for maintenance. This inventory also includes all elevators and cranes. In making this inventory, the shortest description that will identify a machine is used. As an example, "one engine lathe 14 × 6 comp. taper" means an engine lathe with 14-in. swing, 6-ft. bed over all, screw cutting, without special gearing, with compound rest and taper attachment.

Machines built on order or by the owner can be appraised as data on similar machines accumulate. Allowance is made in all cases for the cost of freight, cartage and labor of erection. It should be understood that no prices are fixed arbitrarily by the appraiser. The figures are discussed with the owner or manager and as much assistance as possible obtained from their records.

Shafting, Belting, Piping, etc.

By figuring in detail representative lines of shafting, with couplings, hangers and pulleys included, various factors per lineal foot erected have been obtained. Experience soon teaches which factor to apply when examining lines of shafting in actual use. The most satisfactory method by which belting may be rapidly inventoried is to measure the main belts by eye. The machine belts can then be classified in groups, as similar machines will require about the same amount of belting. Steam heating, where consistent

throughout the plant, can be appraised on a floor area basis. Where the amount of steam varies a price per lineal foot of coil or per radiator can be easily ascertained. The piping used for manufacturing purposes presents the greatest difficulty. The steam and water pipe in a steam power plant will vary little from a standard figure per horsepower of boiler rating. For long runs of covered steam pipe through rooms where there are few or no outlets, a price per lineal foot can be used.

Electric wiring should be divided into two main groups, one for lighting and the other for power. The number of light outlets in each room can usually be obtained from the electrician on the premises, and a factor per light applied to those of each size. The horse power of motors can be obtained from the inventory of machines. For the wiring to electric welding machines, where these are supplied from a central dynamo, a factor per machine can be used.

Furniture and Apparatus

In every plant there is a large amount of equipment (exclusive of small tools, dies, etc.) that cannot be classified under the head of machines and yet does not belong to any special class. This equipment is covered under the term "furniture and apparatus." All furniture, benches, racks, trucks and scales come under this heading. In a metal working plant all boxes, trays and cans can be covered under this.

All machine shops contain an equipment of small tools and all metal working plants an equipment of dies. The proportion that the value of these bears to the value of the whole varies greatly with the class of work. Experience has shown that factors per producing machine can be used that will give a fairly accurate appraisal.

Patterns, Drawings, etc.

Depreciation plays an important part in finally determining the value of patterns and drawings. So many patterns are obtained from outside that the most satisfactory method is to examine the shelves in the pattern storage, classify them into a few groups and estimate a price per square foot of shelf area for each group.

With drawings, the pay roll, plus overhead expense covering the entire time since the drawings began to accumulate, gives the most accurate basis. For replacing cost, the present rates of pay should be used, but a deduction should be made for time spent in experimental work in either case.

Depreciation

A building badly out of repair naturally deserves fairly heavy depreciation. A building in good repair, but so antiquated in size and shape that it is manifestly unsuited for the uses to which it is being put, also deserves a reasonably heavy deduction. When, however, a building is of such dimensions that it perfectly answers its purpose, has remained plumb and is constantly kept in repair, actual age has little influence on judgment. It is considered that about five per cent of the new value is enough. In other words, buildings are not depreciated a certain per cent a year, but have a flat amount deducted on account of condition and not on account of age.

With machines that need repairs at all points from time to time, a day arrives after a period of years when it is better to throw them out altogether and replace with new rather than continue to repair them. To all of that nature a depreciation table is applied, allowing 2, 2½, 3, 4 or 5 per cent a year, deducted from the net and not from the gross. The probable average life

is ascertained and the table that best fits is used, but seldom is the depreciation carried to a point beyond 50 per cent.

There are many kinds of machines where the main portion, sometimes as much as 80 per cent of the total value, remains for years with practically no wear. The small moving parts, however, wear so rapidly that they are constantly being replaced. This is true of a great variety of machine tools, metal, wood and paper working machines. With these it is considered that the wearing parts are always in a state of 50 per cent depreciation, and the amount deducted is half of the percentage the value of the wearing parts bears to the total value of the machine.

It is quite apparent that to obtain the age of shafting, belting, piping, etc., would in nearly all cases be impossible, so that general figures for depreciation are safest to use. Shafting shows such slight wear that depreciation is seldom recognized. Main belts wear slowly, while machine belts will always average 50 per cent wear, so that, as a rule, the total amount of belting is depreciated 33 1/3 per cent. Piping will last for years, except where exposed to acid fumes. Pipe covering and valves show wear, but piping as a whole is seldom depreciated more than 10 per cent.

Electric wiring wears little and is usually kept pretty well up to date on account of the rigid rules of both local authorities and the insurance companies.

The miscellaneous equipment classed under the head of "furniture and apparatus" is made up of objects most of which are constantly wearing out. The amount is, therefore, usually depreciated from 20 to 50 per cent.

Small tools, dies, print rolls and electrotypes wear out, but they are affected to a great extent by obsolescence. Patterns, drawings, moulds and lasts are subject to depreciation for the latter reason only. In determining the amount to be deducted from the new value of any of these the appraiser must ascertain what proportion of the equipment is indispensable or practically new.

Harry Baker spoke on the cost of appraisals, when a discussion of the paper was called. He said he understood that in a Connecticut appraisal the height of every telephone pole had been measured. The result was a cost of between \$3 and \$4 per \$1,000 appraised. He asked what Mr. Morse thought his method would cost. The latter replied that he estimated the cost between 10c. and 15c. per \$1,000.

Russian Iron and Steel Output in 1916

Pig-iron production in Russia for the first six months of 1916 is reported at 1,818,180 metric tons, against 1,887,385 tons and 2,365,108 tons for the first six months of 1915 and 1914 respectively. The production of finished iron and steel is returned as 1,621,620 tons to July 1, 1916, while to July 1, 1915, and 1914 respectively it was 1,644,240 tons and 2,147,106 tons. In 1916 to July 1 Russia imported 155,151 tons of finished steel, against only 24,226 tons to July 1, 1915.

A process of obtaining coke and by-products from coal, with the object of producing a coke containing such a percentage of volatile matter as to provide a smokeless fuel, burning freely with a long flame, at the same time producing condensable by-products of superior quality, is patented by Harvey P. Bostaph, of Detroit, Mich., in U. S. Patent 1,204,647 of Nov. 14, 1916. The coal is subjected in relatively thin masses to a comparatively low but gradually increasing temperature so as to cause the distillation to progressively proceed from one long edge of each thin mass of coal toward the other long edge where the distilled products escape. Sub-atmospheric conditions are maintained, facilitating the escape of the distilled gases and preventing any harmful effect on the volatilized products. The coking is claimed to be not only thorough, but is performed within a commercially reasonable time, varying from 3 to 4½ hours. The apparatus recommended is described in the patent.

Book Reviews

Cost Accounting and Burden Application. By Clinton H. Scovell, Scovell, Wellington & Co., Boston. Pages, 316; 5¼ x 7¾ in. Published by D. Appleton & Co., New York. Price, \$2.

In preparing his work for manufacturers Mr. Scovell finds the subject so neglected that he quotes the report of the Federal Trade Commission that "a large proportion of manufacturers are not making the money they should; a great many are actually losing money." There has been a lack of adequate information in regard to the conduct of business, the author points out, and many producers have failed to take advantage of the experiences of others, because they believe their business unique. Referring again to the Commission report that "no line of manufacture is so complicated that a system cannot be devised which will give reasonably accurate results," the author offers his book as the exposition of a system applicable to any industry.

Mr. Scovell urges that profit and selling price be regulated as a percentage of cost. The burden of unused facilities should be kept out of the cost of the product, charged to the loss and gain account at the end of the operating period, and deducted from the profit. Other points on which the author lays stress are that interest is chargeable to manufacturing costs, that administrative control should extend directly and competently to all lanes of expense determination and a definite manufacturing and selling policy should be established. In connection with the discussion of the significance of interest on investment as a part of cost, the author has added an appendix containing citations from the writings of modern economists on this subject.

A machine-hour rate of charging burden to cost separates the burden chargeable to the product from the burden of carrying idle equipment (unearned burden). The former is a barometer, the author asserts, indicating the efficiency inside the shop, while the latter registers the industrial situation in the outside world. A budget based on the pre-calculation of expenses is another feature.

Chapter 16 deals with foundry costs and gives an itemized processing of cost determination. A note of warning is sounded that where foundries operate in conjunction with machine shops the cost of operations be equitably divided.

Although the volume contains no illustrations of job and cost cards or charts, the exposition is so detailed and yet so lucid that students of the elements of cost proportioning as well as managers desiring to improve an existing system will find the work of practical value.

Heaton's Annual. Pages, 518; 4% x 7¼ in. Published by Heaton's Agency, 32 Church Street, Toronto, Canada. Price \$1.25.

This Commercial Handbook of Canada and Boards of Trade Register, which is now in its 13th year, contains lists of Government officials, insurance companies, banks, railroads and steamships, in addition to postal, parcel post and cable rates, information on the cost of travel, commercial regulations, customs tariff, etc. All of the bulletins and memoranda issued by the customs department to its officials are given in a digest. A reprint of the tariff of 1907 with amendments to date is given in this section, and an index to the tariff makes it easy to find the provisions relating to any particular article. In connection with the regulations of the department a number of examples showing how to compute the duty are included. A special feature of the book is a "Where To Find It" section, to which references are made throughout the text of the annual. This section is a guide to the reports of the Dominion and Provincial governments and standard publications throughout the United States and Canada. Descriptions of the towns of any commercial importance and the customary tables of discounts, exchange, weights and measures, etc., are included.

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THE IRON AGE

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Transportation Getting Worse

Possibly it was to be expected with the setting in of actual winter conditions, but the transportation situation has grown worse in the past two or three weeks. Complaints are being heard everywhere of the inability of railroads to give their patrons anything like satisfactory service. Manufacturers are not getting needed deliveries of raw material, nor are they able to make full shipments of their products to customers.

An especially aggravating feature of the existing transportation conditions is the shortage of fuel, which is now widely felt. Manufacturing establishments located close to large coal-mining operations have been obliged to discontinue operations for days simply because coal was not being delivered by the connecting railroads. Cities and towns are being threatened with privations through the lack of fuel. The banking of blast furnaces for want of coke has come to be an old story. If conditions do not improve soon, however, more furnaces will be obliged to bank or to go out of blast. The announcement the past week that the Baltimore & Ohio Railroad had declared an embargo on all freight routed for points west of Pittsburgh, except engine fuel, Government freight and perishable goods, is notice to consumers that one of the most important sources of the supply of fuel for the Central West is being cut off. This undoubtedly means that thousands of cars of coal and coke will be prevented from reaching that busy section of the country and will make the situation there much worse.

As set forth in an editorial in these columns in our issue of Jan. 4, this condition of affairs is due to the heavy hand which has been laid on railroad matters by the Government and by railroad commissions. The railroads have not been permitted to earn a sufficient surplus over their bare requirements to enable them to make the needed improvements and to increase sufficiently their equipment, which should have been done in recent years to enable them to meet such a contingency as they now face. The railroads of the country have not grown at a proportionate rate to the growth of the country's business, and therefore the business of the country suffers.

Do we find that a lesson is being learned from such conditions as those through which we are now passing? Apparently not. It is deplorable to think that the lesson is being completely lost by men who

should take heed. Only a few days ago the United States Supreme Court by a tie vote decided that the railroads of the country were not entitled to the amount they have claimed for carrying mail matter in the four years ended Nov. 1, 1912. The railroads up to March, 1907, had been paid on the basis of the average amount they carried for a certain number of consecutive days. The method at that time was to take the total weight for 105 consecutive days and divide by the number of days. The divisor previous to March, 1907, was 90, which was obtained by eliminating all Sundays, when little mail is carried. But the Post Office Department then arbitrarily ordered that the divisor should be 105, being the entire number of days—including Sundays—over which the tests were made. This increase in the divisor cut the daily rate below what the railroads considered a fair average and they brought suit to cover what they claimed to have lost in the first four years after the order was enforced. The total amount which would have been secured by the railroads if the suit had been won was \$35,000,000, and from Nov. 1, 1912, up to the present time it would probably have amounted to \$70,000,000. It would seem to an impartial observer that the old method of eliminating Sundays was fair and that the Post Office Department was not justified in taking the full 105 days with Sundays included. Here was an opportunity for the members of the United States Supreme Court to show that they were inclined to the belief that a fair day's service was entitled to a fair day's pay, but there were not enough judges of that opinion to control the court. The casting of the tie vote lost the suit to the railroads. Possibly the day may dawn when the railroads will get proper consideration and be enabled to earn sufficient funds to keep pace with the country's growth. That day, however, does not seem any nearer.

Business Co-operation of the Future

There are signs that the word co-operation has not been altogether banished from the Government's vocabulary of business. It was so recently as the regime of the last Administration at Washington that a request from a corporation or an association of business men for advice as to the permissibility of a contemplated step was met with the reply in substance that the way to find out was to take the step; if prosecution followed that would be the

Government's way of saying that the action was not approved. To-day the prosecutions are fewer but the situation as to advice on a legal question is about the same.

Retiring Chairman Hurley of the Federal Trade Commission takes the ground that if the work of the commission goes to the length it should, it will be possible to know in advance what co-operating business men may and may not do. In his address before the Commercial Club of Chicago on Jan. 13 he said on this point:

Successful co-operation requires a friendly spirit on both sides [Government and business] if we are to accomplish real constructive work. When business men request advice in advance on some particular step they wish to take, they should present to the Government an intelligent statement of the facts; then Government *should give advice in advance* as to what business men should or should not do. This applies to legal questions as well as to economic ones. Many times business men feel that the questions they want answered are legal when in reality they are economic.

There is now no machinery for any adequate advice in advance and the difficulties of providing it are obvious. The Federal Trade Commission might, indeed, as it has done in some instances, indicate lines on which manufacturers might profitably work in association, in studying cost accounting, standardizing of processes and products, or even certain phases of trade practice. But there has not been any encouragement—and under the Sherman act there could not be—to trade agreements which involved price maintenance. That the work of the Federal Trade Commission in insisting on real cost finding has accomplished in a sound and constructive way a part of what has been aimed at in the price agreements of the past is highly significant. The price associations brought together the sheep and the goats. The price was made high enough to give a profit to the least efficient organization and the poorest plant, and the consumer paid the bill. What the Trade Commission has most agitated is such a knowledge of costs as will prevent cut-throat prices, with their trail of bankruptcy and in the end full compensation, taken from the consumer, for a temporary demoralization of prices that seemed to be in his interest.

It is to be noted as a sign of the times that Mr. Hurley points to a day, even though it be distant, when business in the United States can "take the progressive step which German industry has already taken":

There is no question that when competition fails to regulate, the Government should step in and lend its assistance in helping business out of difficulty. I am, therefore, in sympathy with the referendum of the Chamber of Commerce of the United States, which recommends "that there should be remedial legislation to permit co-operative agreements under federal supervision in those industries which involve primary natural resources." But where business men cannot present true balance sheets, they certainly cannot expect the Government to allow them to get together. If a group of manufacturers, say 100, representing a given industry show a condition where only 10 of all the firms in that industry know their costs, and if they were to come to the Government and ask for permission to form a combination or cartel, I am sure that there is not a man here, if he were in a Government position, who would not refuse to give such permission.

There need be no haste in acclaiming an era in which business will enter into a new freedom from destructive competition. The Congress that will so modify the Sherman act is a long time removed; there may never be such a Congress. But that does not mean that business, with the intelligent co-operation of more friendly Government agencies, may not do much to work out its own salvation. Chairman Hurley strangely sets up combination as a reward of virtue, shall we say, when he points out that "before we are ready to combine in this country, we must first learn to co-operate in elementary and fundamental matters, such as cost accounting, standardization and the like," and adds:

These are things that are in line with sound business, and they are of sufficient importance to occupy the manufacturers and merchants of this country for a number of years. If our business men know their true costs, and if they have an intelligent grasp of business methods, competition will be fairer, and we shall get better prices—prices based on efficiency.

The prediction is not altogether clear, since "better prices" resulting from "fairer competition" are generally reckoned to be more remunerative to the producer, while "efficiency" stands for economies that lower the price to the consumer. With fairer competition and prices based on efficiency, a combine of the old type would be wellnigh impossible.

Revenue Limitations of the Tariff

The vogue of the contention that the tariff should be taken out of politics and be confided to a tariff commission is likely to be attributed to the idea that we have increased in intelligence. It may be the fact that we have, but it is also true that such sweeping changes have occurred that the tariff no longer presents the opportunity for revenue raising, in proportion to the needs of the Government, that obtained some years ago.

Since the latter part of 1915 our imports have been particularly heavy, measured in dollars, chiefly because the valuations per unit are high. Prior to the coming in of this temporary condition our imports, while apparently very large by comparison with the past, showed only a very slight increase per capita, over the imports which a decade and more ago raised a very comfortable revenue for the Government.

On account of the greater activities of the people the imports are relatively smaller, and on account of the much greater activity of the Government the expense of operating it has greatly increased. In the circumstances it would be idle to expect imports to increase in such manner as to continue to provide means for raising the greater and greater revenue required.

As the country has developed it has become more and more self-contained and indeed the great preaching of to-day is that it should be entirely self-contained. How could a nation thus happily fixed be able to secure the revenue for operating its Government by taxing imports?

The steady progress toward the nation's becoming self-contained, and the continued increase in the expense per capita of operating the Government, make the tariff less and less a means of raising adequate revenues. It is only necessary to ob-

serve the annual budget of the Government and compare it with possible tariff revenues, by applying various rates of duty to the imports as reported, with allowance for such reductions in imports as would occur through increasing duties, to see that the tariff cannot possibly be depended on for the large proportion of the Government's revenue that it used to furnish.

There is more or less "making a virtue of necessity" in the movement to take the tariff out of politics. There are some politicians wise enough to see that even by abandoning their pet theories, as to how a tariff should be constructed they could not produce one that would result in the desired revenue. For years the trend of events was such that an income tax would eventually be necessary. A tax on the larger incomes having been established, the next step, as advocated by Chairman Gary last week, is to broaden its scope and make it apply to more incomes.

The bald fact is that through the progress of events the tariff has failed as a revenue producer, in keeping with revenue requirements. There is a good use to be made of the tariff, and to that use it should promptly be put. For years it has been used to very good advantage by the great majority of foreign nations as a scientific, not a haphazard, means of promoting industrial development. After the war, the making of tariffs will be prosecuted with tenfold zeal in countries in which the tariff has hitherto been depended upon for results, and the principle will be adopted in England, to be applied in the most thorough manner. The first step in the making of a scientific tariff is to admit frankly that revenue producing as the chief function or capability of a tariff for the United States has passed into history with the march of events. In future the producing of revenue must be considered, not incidental, but at least subsidiary. The function of the tariff must be to develop industries: first, to forward the nation on its road toward being entirely self-contained; second, to promote export trade both by encouraging domestic producers and by furnishing means of bargaining with foreign countries for reciprocal arrangements. When definitions can be written, for the people of a whole nation, for the terms luxury and necessity, the question of a "tax on luxuries" can be intelligently taken up.

Women in the Drafting Room

The intense demand for intelligent men in manufacturing has created a deficiency in the supply of that class of young men ordinarily employed for such draughting-room tasks as do not require experience. As a consequence young women have been taken on for the work, and some of them have been so successful that they are looked upon as a permanent factor in this important department. The experience of a prominent machine-tool building establishment is probably typical. None of the several girls now employed in the drafting room had had an experience directly fitting her for her new duties, and yet all were soon on the way to efficient performance. The company's shop system requires many charts and specification sheets, which in the works are used in the form of blueprints. Therefore much lettering is required of the

drafting room. The young women do the work excellently. The lettering is handsome and highly legible; their average speed is greater than that of boys, and they are consistently industrious. They acquire the use of the drawing instruments rapidly and their tracing of drawings is highly creditable.

Beyond this point the capabilities of women have not been tried out. They have yet to demonstrate how far they can go in mechanical designing. Doubtless some of the more ambitious who will give time to study will eventually develop talent in this direction, while others will fail. But much the same can be said of the boys, who when they enter upon the work are either wholly ignorant of mechanical principles or have only the rudimentary knowledge acquired in manual training or trade school. As is well known, women have made themselves indispensable in the designing departments of certain industries, but there the work has to do with things artistic or perhaps essentially feminine. Such work is to the new as the design of a breast-pin or rug or of wall paper is to the design of an engine lathe. It is a question whether the female brain will travel very far into the intricacies of machinery.

Locomotive Orders

Locomotives continue to be ordered liberally, 245 having been contracted for in the past week. The American Locomotive Company will build 24 Santa Fes for the Southern Pacific, 50 Santa Fes for the New York, New Haven & Hartford and 20 Santa Fes and 5 Mallets for the Northern Pacific. The Baldwin Locomotive Works will build 50 consolidated and 75 prairie locomotives for the British war office. The Union Pacific is reported to have ordered 10 locomotives from the Lima Locomotive Corporation. Using the annual statistics of the *Railway Age Gazette* and deducting the business placed in Canada, it is estimated that the orders placed in the United States in 1916 were for 5750 locomotives, of which over half, or 2900, were for export.

Crude Steel Exports Around 1,500,000 Tons in 1916

Exports of steel billets, ingots and blooms in 1916 will probably approximate the striking total of 1,500,000 gross tons, the figures for the 11 months to Dec. 1 having been 1,345,826 tons, or 122,347 tons per month. The November movement was 125,038 tons, contrasting with 162,679 tons and 163,104 tons in October and September respectively. To Nov. 1, 1916, France had taken 784,657 tons, or over 60 per cent of the total of 1,220,788 tons to that time. The shipments to the United Kingdom had been 200,963 tons in the same 10 months.

Rapid Growth of Pig-Iron Exports

Pig-iron exports in November, 1916, reached the unprecedented total of 102,786 gross tons. In October they were 101,756 tons. For the 11 months to Dec. 1, 1916, the exports were 507,046 tons, so that the October and November movement of 204,542 tons was nearly 40 per cent of this total. The remainder was distributed over the previous nine months at the rate of only 33,615 tons per month, showing the rapid expansion of these exports in the closing quarter of last year.

The making of permanent magnets is a new Sheffield industry as a result of the war. Not only small magnets, such as are used in magnetos, electric meters and ships' compasses, but one of the largest steel firms is busy making large electro magnets for lifting iron and steel material.

WEBB BILL PROSPECTS IMPROVE

Senate Committee Likely to Eliminate Objectionable House Amendments

WASHINGTON, Jan. 16, 1917.—The Senate Committee on Interstate Commerce has decided to refer to a special sub-committee the Webb bill legalizing combinations of American manufacturers and exporters for the development of foreign trade. This has been decided on to enable a small sub-committee to take the measure up in detail and perfect its provisions. A majority of the full committee now appears to be of the opinion that the bill should be enacted and therefore that it should be reported to the Senate as soon as practicable. The committee is also convinced, however, that the bill in the form in which it was passed by the House is open to serious objections, the most important of which were pointed out by the witnesses who appeared at the hearing before the committee on Jan. 5.

The erroneous impression prevails in some quarters that the Webb bill as framed by the Federal Trade Commission was passed by the House substantially in its original form and that the amendments which are being urged by those who desire to take advantage of the proposed law are new provisions which have not heretofore received consideration in Congress. As a matter of fact, the advocates of the Webb bill would be fairly well satisfied if the measure should pass in the form in which it was originally introduced in the House at the instance of the Trade Commission. The House Judiciary Committee reported the bill substantially without change, but in the House the measure was loaded down with amendments which should be understood by all business men interested in the export trade, as it is the present purpose of the Senate Committee to eliminate these modifications and to restore the bill to its original form with a few changes calculated to clarify and strengthen its provisions.

The House Amendments

The House amended three important sections of the Webb bill by making material changes to which the champions of this legislation are now strenuously objecting. The first paragraph of section 1 as passed by the House reads as follows, the matter inserted by the House being indicated in italics:

That the words "export trade" wherever used in this act mean solely trade or commerce in goods, wares, or merchandise exported, or in the course of being exported from the United States or any Territory thereof to any foreign nation; but the words "export trade" shall not be deemed to include the production, manufacture, *trading in, or marketing* within the United States or any Territory thereof of such goods, wares, or merchandise, or any act in the course of such production or manufacture.

The elimination of "trading in or marketing" from the various business operations included from the purview of the proposed law would, in the opinion of its chief advocates, render it practically impossible to carry on any foreign business under its provisions. Every exporting organization, unless its members actually manufacture the products dealt in, must "trade in" them in the United States in order to obtain possession of them for sale abroad.

Senator Brandegee's declaration that the bill as passed by the House is a "gold brick," was based upon amendments added to section 2, which as enacted by the House read as follows, the matter inserted being indicated by italics:

That nothing contained in the act entitled "An act to protect trade and commerce against unlawful restraints and monopolies," approved July 2, 1890, shall be construed as declaring to be illegal an association entered into for the sole purpose of engaging in export trade and actually engaged solely in such export trade, or an agreement made or act done in the course of export trade by such association, provided such association, agreement, or act is not in restraint of trade within the United States, and does not restrain the export trade of the United States.

As pointed out by Senator Brandegee, the words "and does not restrain the export trade of the United

States" completely nullify the purpose of the law. Secretary Patchin of the Foreign Trade Council dwelt with special emphasis on this point and made it clear to the committee that the entire movement for the enactment of the Webb bill is based upon the understanding that the proposed combinations for the development of foreign business would "restrain the export trade of the United States" in the sense that similar restraint of domestic trade is now prohibited by the Sherman and Clayton anti-trust laws. In other words, the primary object of the Webb bill is to secure authority to make such pools and combinations for export business exclusively as would not be permitted by existing law in the case of domestic business. It is confidently believed that the sub-committee will eliminate the objectionable clause from section 2.

Section 3 of the Webb bill was rendered obscure and ambiguous by the House which cut out an important clause embodied in the original draft by the Trade Commission. This change is shown in the following quotation, the clause eliminated by the House being included in brackets:

That nothing contained in section 7 of the act entitled "An act to supplement existing laws against unlawful restraints and monopolies and for other purposes," approved October 15, 1914, shall be construed to forbid the acquisition or ownership by any corporation of the whole or any part of the stock or other capital of any corporation organized solely for the purpose of engaging in export trade, and actually engaged solely in such export trade, unless the effect of such acquisition or ownership may be to restrain trade or substantially lessens competition within the United States [in articles of the kind exported by the association whose stock is acquired or controlled].

In the bill as drafted by the Trade Commission the effect of foreign combinations in restraining trade or lessening competition in the United States was limited to articles of the kind exported by the association whose stock was acquired or controlled by the corporations referred to. The elimination of the words included in brackets, however, would open up a wide field for speculation and litigation, for the reason that it would permit the claim to be set up that the operations of an export combination dealing in a certain class of merchandise had had the effect of restraining trade or lessening competition in some other line to a greater or lesser extent. The whole field of economics could be traversed in the effort to hamper export combinations and thus the primary object of the Webb law be easily defeated.

Probable Course of the Bill

While the amendment of the bill by the Senate Committee will make it necessary for the measure to go back to the House for concurrence in the changes made, the leaders of the lower body express the opinion that ample opportunity will be afforded for a vote on the measure. It is further indicated that the House Judiciary Committee, which has jurisdiction of the bill, will promptly accept the Senate amendments and will recommend concurrence by the House without the formality of reference to a conference committee. As it is probable that the Senate will report the bill with a favorable recommendation in the course of a few days and as the Administration leaders of the Senate are anxious to secure early action the outlook for the final passage of the bill at the present session is much more encouraging to-day than it was a week ago. An important factor in the improved situation is the willingness of several members of the Senate Committee, who have expressed the view that the Sherman and Clayton laws do not apply to export trade, to permit the Webb bill to be enacted as a declaratory measure. W. L. C.

The old Williamson blast furnace at Birmingham, Ala., now being scrapped, was built by the late C. P. Williamson in 1886, and had a daily capacity of 60 to 70 tons. For several years it furnished foundries owned by Mr. Williamson with metal and was recently sold as a part of the Williamson estate. It was impracticable to operate with its small capacity and the absence of raw material holdings.

Twelve-Hour Day and Seven-Day Week

Comments by W. B. Dickson on the
Present Status of These Problems in
the Steel Industry of the United States

IN an address before the American Association for Labor Legislation, at Columbus, Ohio, Dec. 29, William B. Dickson, second vice-president and treasurer of the Midvale Steel & Ordnance Company, gave his views on the weekly day of rest and the 8-hr. shift in continuous industrial operations. Speaking with special reference to the steel industry, he said:

Federal Control Advisable

The recent action of a steel company in seeking relief from certain New York State restrictions has indicated the handicap under which an employer may have to operate when the State laws governing conditions of employment are more stringent than those under which his competitors operate in adjoining states.

If to this domestic handicap there is added the danger of competition from foreign makers not subject to like restrictions, it is evident that we have here the elements of a serious situation. This would indicate the necessity of Federal instead of State control, and also injects into the situation the vexed question of protective tariff laws or the even more drastic question of trade embargoes. This is another argument, if any were needed, for the wiping out of State lines in all matters of legislation which affect the nation as a whole.

There are two methods by which changes in the social status can be made: by evolution and by revolution. This country has had a bitter experience of the latter method. This generation is far enough removed from the passions which were engendered by the Civil War to see some of the phases of that conflict and of the causes leading to it in their true perspective.

If the abolitionists had given more consideration to the fact that human slavery, as it existed in the fifties, was an evil inheritance from past generations, and that the blame for it was properly chargeable on the New England merchants who had trafficked in slaves and in the products of slave labor, as well as on the actual masters of the slaves; and if, on the other hand, the Southern planters had not permitted their prejudices to affect their ability to estimate properly the force of public opinion on the question of human slavery, it would seem that there should have been no insurmountable difficulty in freeing the slaves at a cost to the whole country which, while amply compensating their legal owners, would not have been a tithe of the money cost alone of the war, leaving out of account the lives sacrificed and the arrested development of the Southern States.

Long Hours an Inheritance

The seven-day week and the 12-hr. day in the steel industry are evil inheritances from a former generation, and I regret to say that the company with which I was identified for many years was not blameless in maintaining these conditions.

It seems to me that in considering this industrial question we should seek a solution along evolutionary lines rather than revolutionary. It is perhaps fortunate that in the majority of the continuous processes there are only two alternatives—a 12-hr. day, or an 8-hr. day. The issue is thus made clear. There are two principal difficulties to be considered:

1. The adjustment of the old wage rates to the new conditions.

2. Securing and training the additional men required.

If a certain position now pays \$3.60 for 12 hr. labor, the cost of 24 hr. labor to the employer is \$7.20. If this same total cost is to be distributed among three

men working only 8 hr. each, the pay of each is reduced to \$2.40, or a reduction of 33 1/3 per cent.

On the other hand, if the same rate of pay per man which was paid for 12 hr. is now paid for 8 hr. the total cost to the employer for 24 hr. is increased to \$10.80, which is an increase in his labor cost of 50 per cent. It is not reasonable to suppose that workmen would submit to any such radical reduction in their pay; certainly not under existing conditions.

On the other hand, the increase of 50 per cent in the labor charge to the employer is too radical to be considered by anybody except the impractical theorist. It is apparent, therefore, that if the 8-hr. day is to be adopted in the continuous industries, it must come as the result of a compromise on the question of wages; and in addition, the employer must be given a considerable period in which to adjust his business to the new conditions.

Labor Supply Insufficient for Eight-Hour Day

As to the second proposition, i.e., the securing of a sufficient supply of labor, this would of course mean that where a factory now operates with 1000 men working 12 hr., an additional 500 men would have to be found, housed and trained, to provide three shifts. Under present conditions, it is only necessary to state this problem to show how completely impracticable it is.

Negro Labor in the North

The usual source for increase in labor forces, immigration, is shut off and the natural increase is entirely inadequate to meet the requirements of our rapidly extending industries. This has brought to the front a resource which I fear contains within itself a serious menace to living conditions of our workingmen, namely, the steadily increasing stream of negro laborers from the Southern States.

I have been informed by one in position to know the facts that in the past year there have been employed at the works of a prominent steel company in the Monongahela Valley over 4000 negro laborers. I have no unreasoning prejudice against the negro. I am ready to concede that he has the same right as myself to life, liberty and a reasonable opportunity for the attainment of happiness; but I also believe that no good can come to either race by an attempt to amalgamate them socially or economically, and that this sudden influx of negro labor into our Northern industrial centers is full of menace to all concerned. Workmen and those who advocate sudden changes in our industrial system should consider whether they may not for a time at least "rather bear the ills they have than fly to others that they know not of."

There should be no flinching from this issue, however, and if the leading employers are not willing to co-operate in the abolition of the 12-hr. day, then the power of the government must be invoked to compel a readjustment to more humane conditions.

The Seven-Workday Week

As to the seven-day week in the steel industry, I had hoped that this relic of barbarism was a closed issue, but from the recent action of a large steel company it would seem that this "snake was only scotched but not killed." I will not insult your intelligence by making any plea for the abolition of the seven-day week.

Some years ago the officers of a prominent steel company issued a circular to their stockholders in which the statement was made that a large number of men had left their service rather than be deprived of the privilege of working seven days a week. It would

seem to me a fair assumption that if this statement was correct it would indicate one of two conditions:

1. These men were either originally of a low mentality and brutish instincts, or else they had been brutalized by the conditions of their employment, or

2. The wages paid to them were insufficient to meet their living expenses unless they worked seven days a week.

It would be interesting to see on which horn of this dilemma the signers of the statement would choose to be impaled. The great pressure for output, due to the tremendous demands on the steel companies, has no doubt led to a relaxation of the rule adopted by some of these companies, but there can be no permanent backward step in this movement; and I have sufficient confidence in the wisdom of the men who are responsible for these companies to believe that for business reasons, if for no higher motives, the high standards heretofore set will be maintained.

As a general proposition I believe in the 8-hr. day in all industries where the only other alternative is the 12-hr. day. I am on record publicly on this question, and I am confident that eventually and in the near future this condition will be brought about.

These issues have been on trial before that great American court of last resort, public opinion, and a verdict has been rendered against any system of employment which denies to the worker an opportunity to live a normal human life. The employers in facing these issues have in the main, as so many times in the past, mistaken mere inertia for true conservatism and it behooves them to put their houses in order, for the doom of these unsocial practices is writ large on the scroll of fate which is slowly unwinding from the knees of the gods.

Oglebay, Norton & Co. Iron Ores

Several new ores are listed in the 1917 Lake Superior iron-ore analysis book of Oglebay, Norton & Co., Cleveland. From the Menominee range comes the Nevada, a soft, red hematite ore, with a guarantee of 55.50 per cent iron, dried at 212 deg. From the same range is offered the Brule, a combination of the Berkshire, a high phosphorus, and the Chatham, a low phosphorus ore. From the Mesaba range, the Madrid, a washed, coarse, hematite ore, has been added. This ore bears a guarantee of 52 per cent iron, natural. Last year only one ore was listed from the Cuyuna range, this being the Mahanomen. This year, in addition, the Mahanomen Nos. 1, 3 and 4 are listed, having different contents of manganese. The No. 1 Mahanomen runs as high as 14 per cent in manganese. The Moose Mountain ore from the Sudbury district of Canada, is no longer offered in cobbled form. All this ore is now being made into briquettes.

German Exhibition of Substitute Materials

An exhibition of substitute materials has been opened at the Zoological Gardens in Berlin, according to the London *Ironmonger*. It is under the auspices of the German Metal Controlling Office and the promoters are the advisory councils for the brewery, the white metal, tin and zinc alloy industries, the Upper Silesian Mining and Iron Works Union and the associations of electrotechnists, ironmasters, engineers and machine builders. Substitutes for materials are being shown by 80 firms. They represent materials used in normal conditions in the electrical industries, machine construction, motors and cycles, iron and brass founding, optical goods and fibrous materials. The exhibition is to remain open during the war and is to be constantly enlarged. Visitors have to sign a declaration that they will reveal nothing and only use the experience gained for their own business.

The British-American Nickel Corporation, Toronto, is having plans prepared by F. J. Brule, 603 Royal Bank Building, for a nickel refinery, to be erected at Wahnapiatae, Ont., at an estimated cost of \$500,000.

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The Wagner Electric Mfg. Company, St. Louis, at its recent annual meeting, increased its capital stock from \$2,000,000 to \$5,000,000 for the purpose of handling its already largely increased business as well as extending its plant construction for which plans have been prepared. The company, in addition to its important domestic business in the electrical field, has been carrying through large contracts for shell cases for foreign governments and this has aided in placing the company in a most prosperous condition. The officers elected are: W. A. Layman, president; James W. Bell, secretary; Albert Blair, W. K. Bixby, James W. Bell, W. A. Layman, J. M. Buick, John F. Lee and Thomas H. West, directors.

Navy Department's Unreasonable Attitude

President Grace Presents a Significant Chapter from the Bethlehem Company's Experience—British Shells May Be "Dumped"

President E. G. Grace of the Bethlehem Steel Company was the guest of honor at a dinner given at the Manufacturers' Club, Philadelphia, Saturday evening, Jan. 13. His address was the feature of the occasion. He pointed out that the policy of the United States Navy was seemingly to discourage private enterprise and to divert all work for national defense into Government plants. He also commented significantly on the new requirements for 14-in. projectile tests which had put them beyond the ability of projectile manufacturers to meet in commercially economic quantities, in the present state of the art. Among other things, Mr. Grace said:

"There was agitation last year for the building of a Government armor plant. Certain of our statesmen at Washington declared that we had been 'robbing' the Government, although the figures showed that our navy had, for twenty years past, paid less for armor than the navy of any of the other great powers.

"We did not concede that our prices for armor were too high, but we did agree—if the Government would abandon its plans for a Federal plant—to make armor for our navy at any prices the Government itself might consider fair.

"Does anybody imagine for a moment that we would have made such an offer if it would show that our previous prices had been exorbitant?"

Building a New Gun Plant

"In the development of our navy now being pushed forward, larger ships are to be built and greater guns are called for than ever before. One of the special needs is 16-in. guns—guns 60 ft. long and capable of hurtling a 2000-lb. shell with such power and accuracy as to hit a 50-ft. square target 15 miles away. Such guns call for the highest skill and experience of the gunmakers' art. Upon such guns may depend, indeed, the safety of the nation.

"In view of this need and realizing that our own experience was probably unique, we have undertaken voluntarily to construct, at a cost of \$4,500,000, a plant fitted to build 16-in. guns. Under no conceivable circumstances can orders which we may receive for this plant pay even a fair return on the investment. But we are devoting to this purpose profits received from other business. We felt that we must do this as a part of our patriotic obligation.

"The prices charged the Government should, of course, be reasonable, and the Government has ample ways of satisfying itself that prices are reasonable. The fact, however, that a price is high does not indicate that it is unreasonable. Nor does the fact that a fair profit is asked indicate greed on the part of the manufacturer.

Hadfield Shells Might Be "Dumped"

"Considerable comment has been made upon the fact that a British manufacturer recently bid less than American manufacturers for 16 and 14 in. shells for the navy. I am unable to state the basis upon which the English bid was made. It should be remembered, however, that this bid was for a specific shell, samples of which are being sent over for test—a test not yet made. It should be remembered also that though there has been an enormous consumption of shells on land, the British navy has been in action but little since the war started.

"It is entirely conceivable that there is a considerable surplus of naval shells on hand which the British Government might be willing, even in time of war, to have its munition makers 'dump' on our market and turn the proceeds into shells for use on the battlefield.

Losses on 14-in. Shells

"Now, as to the bids made by American manufacturers, particularly ourselves. You, as manufacturers, know that all bids must be based upon actual experience. Certain experience Bethlehem has had with the making of naval shells will illustrate my meaning. Two years ago we took an order for 2400 14-in. armor-piercing shells at a contract price of \$768,000. These shells were to be delivered within a certain time or we had to pay a large penalty. The part of our plant used for the manufacture of these shells was in no demand for European work, nor for any other purpose, and if we could not use it successfully on this contract it was all lost effort.

"The only specifications which the Navy Department gives for the guidance of manufacturers in making these shells is that they shall be of a certain size, and that they must pierce armor plate at a certain velocity, on impact. The quality of the armor plate is not standardized, and it is impossible for a manufacturer to foretell the exact conditions of the tests to which his shells will be subjected.

"We had made large quantities of shells in the past which had been accepted by the Navy Department, but in placing the particular order referred to for 14-in. shells the Navy Department altered the angle at which the tested shells must pierce armor plate.

New Test Could Not Be Met

The proposition was new, but we were assured by officers of the department that the shells then being produced would meet the Government's new tests. The result, however, has been absolute inability on our part, or of any other manufacturers, to produce in any quantity shells which will meet these novel tests. In fact, we know of no process of projectile-making through which it is possible to produce in quantities shells which will conform to the Navy Department's requirements.

"The result is that up to now on that contract of \$768,000 we have put into actual operating expense \$447,881, and have been penalized for non-delivery \$495,744, a total of \$943,625, with no receipts whatever.

"Before we realized what was to be our experience with the contract for 2400 shells we took a subsequent contract for 1800 shells at \$747,000. Having been unable to produce any shells which would pass the test on the first order, we have, of course, not yet begun the second order, and we are already confronted with penalties of \$182,391 on that account.

"We have devoted all our ingenuity and resources to meet the demands of the Navy Department, and with every motive both of patriotism and of business to fulfill the contract. But the fact is that the requirements of the department on these contracts have been, in our judgment, absolutely beyond the development of the art of projectile manufacture.

"Such was the experience in the light of which we were called upon recently to bid for 14 and 16 in. shells. Having been unable—after incurring liabilities of more than \$1,000,000—to deliver shells on previous orders which would satisfy the department, we saw no good purpose to be served by bidding at all on more 14-in. shells.

"The 16-in. shell, however, was something new, and we thought it possible that we might be able to meet the requirements. The problem being absolutely novel, we had no basis upon which to make an intelligent bid. If your customer demands something beyond your power to deliver, no price for the article is too high. But we felt that we should bid on the assumption that we could meet the specifications and deliver the goods. We.

therefore, bid on these shells, at approximately the same rate per pound as that of a 14-in. shell contract of one year ago upon which the Navy Department actually awarded contracts.

"That is the whole story. We have not the slightest idea what profit there will be in the making of these shells. We do not know that there will be any profit. Indeed, there is no certainty that even if we receive the contract it would be possible for us to deliver a shell that will meet the test; we cannot know what the nature of these tests will be. But we are taking all the chances, and stand ready to do our part.

"For officers in the Navy Department to assume that any bid made under such conditions is 'exorbitant' is, as we see it, utterly unfair.

"If, however, the Navy Department will make its tests within the known capacity of the projectile-making art, and if these tests shall be standardized, we will undertake to manufacture shells under conditions both as to price and as to time which will be equal to, if not better than, those of any other manufacturer in the world.

The Bid for Battle Cruisers

"The policy of the Navy Department seems to embody an effort to discourage private enterprise and to divert all work for national defense into Government plants. The situation with reference to battle cruisers is an example in point.

"The Bethlehem Steel Corporation controls shipbuilding companies which build perhaps 40 per cent of the tonnage of the United States. Knowing the purpose of the Government to enlarge its navy, we deliberately reserved a large part of our facilities—at the sacrifice of merchant contracts carrying with them very large profits—that it might be available to aid in carrying out the naval program.

"We bid on the new battle cruisers sums which Navy Department experts, after examination of our books and records, found would yield a profit of less than 10 per cent. Indeed, we agreed to assume risks for increased costs of materials and labor that made it possible that these contracts might yield no profit whatever.

"The price for these vessels is, indeed, high, for the design calls for size and speed beyond anything ever before demanded. Now, it so happens that the costs run beyond the amount actually appropriated by Congress on the basis of the cost estimates made a year ago by the Navy Department.

"Finding this to be so, and because shipbuilders could not alter the inexorable cost facts and reduce their bids to a point within the early estimates of the Navy Department, the prices are called 'exorbitant'; the Secretary of the Navy writes a letter to the chairman of the House Committee on Naval Affairs, scoring the shipbuilders, and Congress is asked to appropriate \$12,000,000 with which to equip the Government navy yards to build these ships.

"This request is made without any assurance whatever that the Government can build these ships any more cheaply than the private shipbuilders.

"It would be a real advantage to Bethlehem Steel shipyards to be relieved of any obligation to enter upon this naval construction. The profit from it cannot possibly amount to much, and the responsibility is enormous. But we do feel a patriotic obligation in the matter, and we realize that it is our duty to do everything we can to make our plant and experience available for the use of the American Government.

Will Build at Government Cost

"After careful consideration, therefore, we have determined to make this offer to the American Government:

"If you will build two of the battle cruisers in Government navy yards, we will build the other two at the ascertained cost of building the ships in the Government yards, without additional expense or commissions of any kind. We will also contract to have our ships ready for service ahead of the Government ships.

"Bethlehem's policy is to prepare for peace rather than increase its ordnance-making facilities. We are now working on a construction program involving an

outlay in the next few years of more than \$100,000,000—probably the largest construction program ever undertaken by a single industrial corporation."

FOREIGN TRADE CONVENTION

Features of the Pittsburgh Program for Jan. 25, 26 and 27

The preliminary program of the fourth convention called by the National Foreign Trade Council to be held at the William Penn Hotel, Pittsburgh, Jan. 25, 26 and 27, indicates that in the main the procedure will be followed that made the convention at St. Louis in 1915 and that at New Orleans in 1916 so successful. Again the special feature, apart from the addresses by picked men in the convention proper, will be the group meetings in which delegates will be able in a more intimate way to get light upon export problems. The late afternoon of Thursday, Jan. 25, the first day, is set apart for these group discussions. Group one, of whose committee C. E. Thomas, United States Steel Products Company, New York, is chairman, and H. G. Angevine, Hyatt Roller Bearing Company, Newark, N. J., vice-chairman, will consider foreign credits. Group two will have for its topic commercial education, and at this meeting Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, will speak on a Government employment information service for foreign trade. Group three will consider export problems of the smaller manufacturer and merchant, the meeting being held in co-operation with the American Manufacturers' Export Association, and group four will consider the function of the export merchant and commission house, this meeting being in co-operation with the American Exporters' and Importers' Association. The evening session of Thursday will be in a sense a continuation of two of the afternoon group meetings, and will consider foreign credits and the problems of the smaller manufacturer and merchant.

The address of welcome will be by J. Rogers Flannery, chairman Pittsburgh Foreign Trade Commission, and James A. Farrell will give the annual address as chairman of the Foreign Trade Council.

"World Trade Conditions After the European War" will be the important topic of discussion at the Thursday morning session. "Industrial Reconstruction in Europe" will be considered by W. W. Nichols, chairman United States Industrial Commission to France, and "The Foreign Trade Aspect of the Tariff" by Willard Straight, vice-president American International Corporation, New York.

In the discussion of co-operation in foreign trade Robert H. Patchin, secretary of the council, will speak on "The Webb Bill—Its Necessity." F. J. Coster, president San Francisco Chamber of Commerce, will make an address on "How Commercial Organization Can Aid Foreign Trade Development." At the Saturday session the topic will be "The Development of an American Foreign Credit System."

Hon. E. N. Hurley and John D. Ryan will be among the speakers at the banquet Friday night.

Already 750 delegates have enrolled for the convention—an unprecedented number—and an attendance of 1000 is expected.

Canadian Pig Iron and Steel in 1916

Canadian production of pig iron in 1916 is estimated at 28 per cent more than in 1915 and the gain in the output of steel ingots and castings is put at 42 per cent in a bulletin of the Department of Mines. Returns from producers for the first 11 months, with estimates for December, make the 1916 output 1,171,727 net tons of pig iron and 1,454,124 net tons of steel ingots and castings. Of the latter, 30,639 tons was direct castings. This makes the 1916 output a record, the previous high mark having been 1,128,967 tons of pig iron in 1913 and 1,168,993 tons of steel ingots and castings.

Steel produced in electric furnaces in 1916 is put at 43,790 tons, against only 61 tons in 1915.

Iron and Steel Markets

EXPORT SHIPMENTS LESS

The Year's Total May Fall Below 1916

Canada to Increase Steel Output—More Shell Steel Inquiry for Allies

The steel market is quieter. More attention is given to possible effects of the falling off in the export movement, attributed both to the scarcity of ocean bottoms and to the refusal by railroads of steel and pig iron destined for the seaboard.

Apart from these transportation difficulties, which are not likely to diminish soon, is the question whether the steel exports of 1917 will equal those of 1916. Some predictions in the negative have already appeared from high sources.

An interesting development, showing the intense effort to increase Canadian output, is the contract just closed by the Imperial Munitions Commission for Canada for ten 8-ton Heroult electric furnaces for a plant to be built at Toronto for the commission and to operate on the scrap steel of munitions works. Several months will elapse before steel can be made, but the contract points to the indefinite continuance of the demand for war steel. These furnaces might add 100,000 tons a year to Canada's steel supply.

At the same time there are negotiations with domestic steel manufacturers, with the usual maneuvering over prices, for good sized tonnages of shell steel forgings for the Allies. Third quarter delivery is wanted for the most part and in some cases second half.

Cars and rails still cut a large figure in export inquiry. Italy is negotiating for 4000 cars and Spain for 2100. France has placed 3000 of the 20-ton cars of which her requirements are many times more. Great Britain's coming into the market for car material has caused some stir.

Canadian railroads must come to this side for rails as the two mills there are filled up on steel for the war. For the Grand Trunk on both sides of the line 50,000 tons has come up at Chicago, where total inquiries are about 200,000 tons, including 25,000 tons for the Government line in Alaska. Chile has bought 5000 tons of rails and for the Anaconda's operation in Peru 9000 tons has been placed. The Steel Corporation's Bessemer & Lake Erie road has bought 5000 tons.

The wire situation reflects the cleaning up of certain export contracts and the rather deliberate pace of financial arrangements on barb wire, particularly for Russia. The result may be that wire capacity long devoted to exports may be available for domestic production. The wire market is thus one that will be closely watched. In December the specifications and new orders of the leading producer made a total only once exceeded in a month.

Inquiry for wire rods is urgent, Canadian mills seeking to contract for 25,000 tons. For high-carbon rods \$90 has been named.

In the structural trade December showed the largest bookings since March, the Bridge Builders' and Structural Society reporting that 86 per cent of a month's capacity of bridge and structural shops was contracted for. Among new projects are a James River bridge, 10,000 tons, for the Atlantic Coast Line, and a steel and concrete bridge over the Allegheny River for the Pennsylvania Railroad, requiring 3000 tons of steel.

The pressure on plate mills increases. Eastern mills have before them 150,000 tons. Chinese as well as Japanese shipyard inquiries are now being pushed.

About 200,000 boxes of tin plates are wanted for export to the Far East in the first half. Several makers are under contract for most of 1917.

A large automobile company at Detroit is closing for sheets and bars for delivery to the middle of 1918, on a scale indicating by far the greatest output of cars in its history.

In some directions pig-iron sellers are making more effort to close second half business, but consumers, like those in steel lines, are not convinced of the holding of present prices into the latter part of the year. Export sales include 10,000 tons of Bessemer in the East and 6000 tons at Pittsburgh. Low phosphorus iron has sold in the East at \$57 and the demand is much greater than the supply.

Annual contracts for mill cinder and scale just closed at Philadelphia amount to 200,000 tons. Prices for cinder ranged from \$4 to \$4.50, or 50c. to 75c. above last year's. On scale at \$6 to \$6.50, the advance was \$1 and upward.

As predicted, the railroad situation in the Middle West grows no better; in spots it is worse, and thousands of tons of finished material are held up. The Carnegie Steel Company now has seven blast furnaces banked, while nine others are out of blast.

Pittsburgh

PITTSBURGH, PA., Jan. 16, 1917.

The car situation, which has been deplorable, seems to be getting worse. Embargoes exist on nearly all the railroads east and west of Pittsburgh, and thousands of tons of steel in various forms are piled in mill yards and warehouses awaiting cars for shipment. There never was a time when the railroad situation was so bad, and it will probably be worse before it is better. It is almost impossible to make export shipments. Blast furnaces are being banked for lack of coke, many manufacturing plants are running only part time, unable to get deliveries of raw materials, and steel companies, instead of trying to take on new business, are bending their entire energies on getting material shipped that is already sold. The Carnegie Steel Company has seven furnaces banked for lack of coke, besides others out for various reasons. Out of 59 blast furnaces, it is now operating only 43, the lowest number active in a long time. The Pittsburgh & Lake Erie Railroad is not taking any freight from the Aliquippa works of the Jones & Laughlin Steel Company, which is much the largest shipper on the road. General conditions in the steel trade are quiet, but this is natural,

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,		Jan. 17, 1917.	Jan. 10, 1917.	Dec. 20, 1916.	Jan. 19, 1916.
Per Gross Ton:					
No. 2 X, Philadelphia....	\$30.00	\$30.00	\$29.50	\$20.00	
No. 2, Valley furnace....	31.00	31.00	31.00	18.50	
No. 2 Southern, Cin'ti....	25.90	25.90	25.90	17.90	
No. 2, Birmingham, Ala....	23.00	23.00	23.00	15.00	
No. 2, furnace, Chicago*....	30.00	30.00	30.00	18.50	
Basic, del'd, eastern Pa....	30.00	30.00	30.00	19.50	
Basic, Valley furnace....	30.00	30.00	30.00	17.75	
Bessemer, Pittsburgh....	35.95	35.95	35.95	21.45	
Malleable Bess., Ch'go*....	31.00	31.00†	30.00	19.00	
Gray forge, Pittsburgh....	29.95	29.95	29.95	18.45	
L. S. charcoal, Chicago....	31.75	31.75	31.75	19.75	
Rails, Billets, etc.,		Per Gross Ton:			
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00	
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00	
Bess. billets, Pittsburgh....	65.00	60.00	60.00	32.00	
O.-h. billets, Pittsburgh....	65.00	60.00	60.00	33.00	
O.-h. sheet bars, P'gh....	65.00	60.00	60.00	35.00	
Forging billets, base, P'gh	80.00	80.00	80.00	55.00	
O.-h. billets, Phila....	60.00	60.00	60.00	42.00	
Wire rods, Pittsburgh....	75.00	75.00	70.00	45.00	
Finished Iron and Steel,		Per Lb. to Large Buyers:			
		Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia....	3.159	3.159	3.159	2.259	
Iron bars, Pittsburgh....	3.25	3.25	3.25	1.95	
Iron bars, Chicago....	3.00	3.00	3.00	1.75	
Steel bars, Pittsburgh....	3.25	3.00	3.00	2.00	
Steel bars, New York....	3.419	3.169	3.169	2.169	
Tank plates, Pittsburgh....	4.50	4.50†	4.25	2.25	
Tank plates, New York....	4.669	4.669†	4.419	2.519	
Beams, etc., Pittsburgh....	3.25	3.25	3.25	1.90	
Beams, etc., New York....	3.419	3.419	3.419	2.069	
Skelp, grooved steel, P'gh	2.85	2.85	2.85	1.80	
Skelp, sheared steel, P'gh	3.00	3.00	3.00	1.90	
Steel hoops, Pittsburgh....	3.25	3.25†	3.25	2.00	
Sheets, Nails and Wire,		Jan. 17, 1917.	Jan. 10, 1917.	Dec. 20, 1916.	Jan. 19, 1916.
Per Lb. to Large Buyers:		Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	4.50	4.50	4.50	2.60	
Sheets, galv., No. 28, P'gh	6.25	6.25	6.25	4.75	
Wire nails, Pittsburgh....	3.00	3.00	3.00	2.10	
Cut nails, Pittsburgh....	2.95	2.95	2.95	2.00	
Fence wire, base, P'gh....	2.95	2.95	2.95	1.95	
Barb wire, galv., P'gh....	3.85	3.85	3.85	2.95	
Old Material, Per Gross Ton:		Jan. 17, 1917.	Jan. 10, 1917.	Dec. 20, 1916.	Jan. 19, 1916.
Iron rails, Chicago....	\$27.00	\$27.00	\$29.00	\$17.50	
Iron rails, Philadelphia....	38.00	28.00	27.00	19.50	
Carwheels, Chicago....	19.00	19.00	21.50	14.75	
Carwheels, Philadelphia....	21.50	22.00	22.50	16.50	
Heavy steel scrap, P'gh....	22.00	23.00	27.00	17.50	
Heavy steel scrap, Phila....	22.00	22.00	24.00	16.50	
Heavy steel scrap, Ch'go....	21.00	21.00†	23.50	15.25	
No. 1 cast, Pittsburgh....	19.50	20.00	23.00	15.75	
No. 1 cast, Philadelphia....	20.00	20.00	21.00	17.00	
No. 1 cast, Ch'go (net ton)	15.50	15.50	16.50	13.00	
No. 1 RR. wrot, Phila....	27.00	27.00	27.00	22.00	
No. 1 RR. wrot, Ch'go (net)	23.50	23.50	25.00	15.75	
Coke, Connellsville, Per Net Ton at Oven:		Jan. 17, 1917.	Jan. 10, 1917.	Dec. 20, 1916.	Jan. 19, 1916.
Furnace coke, prompt....	\$8.50	\$8.50	\$9.00	\$3.00	
Furnace coke, future....	6.00	6.00	4.00	2.50	
Foundry coke, prompt....	10.00	10.00	9.00	3.50	
Foundry coke, future....	7.00	6.50	6.00	3.25	
Metals,		Per Lb. to Large Buyers:			
		Cents.	Cents.	Cents.	Cents.
Lake copper, New York....	29.00	27.75	32.50	24.00	
Electrolytic copper, N. Y.	29.00	27.75	32.50	23.62½	
Spelter, St. Louis....	9.75	9.25	10.00	18.25	
Spelter, New York....	10.00	9.50	10.25	18.50	
Lead, St. Louis....	7.50	7.32½	7.40	5.70	
Lead, New York....	7.05	7.50	7.50	5.90	
Tin, New York....	44.25	42.50	42.37½	40.75	
Antimony (Asiatic), N. Y.	14.25	14.25	14.25	42.00	
Tin plate, 100-lb. box, P'gh.	\$7.00	\$7.00	\$7.00	\$3.75	

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

†This is the price which should have been printed last week. All appeared in editor's proof which escaped compositor's attention.

as consumers are largely covered for the first half of the year. Prices are firm.

Pig Iron.—The heaviest inquiry in the local market is for Bessemer iron for export, mostly to France and Italy. One sale of 6000 tons of Bessemer, presumably for France, was reported as made last week at \$35, Valley furnace. It is almost impossible to get cars to load with pig iron for export, but even if these could be had there would be trouble in getting ship room. There is some domestic inquiry for small lots of Bessemer and basic iron, mostly from consumers that have iron already bought, but on which they are not getting deliveries, and they are trying to pick up some iron for prompt shipment to help out. A sale of 500 tons of Southern No. 2 iron was made at \$28, delivered at a point about 60 miles east of Pittsburgh. This is about \$2 per ton less than is asked for Northern foundry iron. If present bad railroad conditions last, it is not unlikely that some Bessemer and basic iron originally sold for export may be released for sale to domestic consumers. Hardly enough Bessemer or basic iron has been sold in the past two weeks or more to establish market prices, but at least one furnace is offering Bessemer iron for second quarter delivery at about \$33 at furnace. The sale of 8000 tons of "basic" iron for export at \$35 per ton, noted in this report last week, should have read Bessemer iron. Last week's quotations are continued as follows: Standard Bessemer iron, \$35; basic, \$30 to \$31; gray forge, \$29; malleable Bessemer, \$30; and No. 2 foundry, \$31 to \$32; all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 95c. per ton.

Billets and Sheet Bars.—The new demand for billets and sheet bars is fairly active, but it is practically impossible to find steel at any price. Recently a fair-sized lot of sheet bars was sold at \$65 at mill, and it is said that as high as \$70 has been done. Consumers who have contracts for their regular supply of billets and sheet bars are getting their steel during this quarter at prices considerably under \$60 at maker's mill. It is doubtful, however, whether any soft Bessemer or open-hearth steel could be bought in the open market at less than \$65; in fact, this price has been paid in more than one case. We quote soft Bessemer and open-hearth billets and sheet bars at \$65 to \$70 per ton,

maker's mill, Pittsburgh or Youngstown; forging billets, \$80 to \$85, for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Structural Material.—The new inquiry is fairly heavy, but, as stated before, local fabricators are not bidding actively on all the new work coming out, as they are already filled up over most of this year. The American Bridge Company has taken a power house for the Acme Power Company, Toledo, Ohio, 1500 tons; a new bank building for the Home Savings & Trust Company, Youngstown, Ohio, and 250 tons of fabricated steel for coal conveyors for the Carnegie Steel Company at Clairton, Pa. The McClintic-Marshall Company has taken 1600 tons for a new steel frame machine shop for the General Electric Company, Erie, Pa. The Pennsylvania Railroad is planing a new steel and concrete bridge over the Allegheny River at Oil City, Pa., to cost about \$2,300,000, and which will require about 3000 tons. We quote beams and channels up to 15 in. at 3.50c. to 4c., prices depending on the size of the order and the deliveries wanted.

Ferroalloys.—Inquiry is fairly heavy and prices are firm. We quote English 80 per cent ferromanganese at \$164, seaboard, but there is no guarantee as to deliveries. Domestic 80 per cent ferromanganese is firm at \$170 to \$175 at furnace. There is still a famine in the supply of 50 per cent ferrosilicon, and fabulous prices have been offered for small lots for prompt shipment. We quote 18 to 22 per cent spiegeleisen at \$50 to \$55, and 25 to 30 per cent at \$65 to \$75, delivered; 9 per cent ferrosilicon, \$39 to \$41; 10 per cent, \$40 to \$42; 11 per cent, \$41 to \$43; 12 per cent, \$42 to \$44; 13 per cent, \$43.50 to \$45.50; 14 per cent, \$45.50 to \$47.50; 15 per cent, \$47.50 to \$49.50, and 16 per cent, \$50 to \$52; 7 per cent silvery, \$29.50 to \$30; 8 per cent, \$30 to \$31; 9 per cent, \$30.50; 10 per cent, \$31; 11 per cent, \$32, and 12 per cent, \$33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of \$2 per gross ton to the Pittsburgh district.

Plates.—The demand for sheared plates for delivery in the second half of this year from carbuilders and shipbuilders is enormously heavy, and it is predicted that prices will go much higher. A leading mill is credited with having sold upward of 20,000 tons for

delivery in the second half to a leading shipyard at 3.50c. or higher at mill. New orders for steel cars are not plentiful. The Southern Pacific is in the market for 300 steel tank and 100 gondola cars; the Piedmont & Northern for 50 coal cars and 100 steel gondolas, and the Texas & Pacific for 100 steel underframe ballast cars and 100 steel tank cars. Leading plate mills are filled up for four to six months and there is no trouble in getting 4c. or higher at mill for sheared plates for delivery in the second and third quarters.

Steel Rails.—The Bessemer & Lake Erie Railroad, owned by the Steel Corporation, has placed 8000 tons of standard sections with the Carnegie Steel Company for 1918 delivery. Makers report the demand for new light rails and also for rerolled rails as very heavy. We quote new light rails as follows: 25 to 45 lb., \$50; 16 to 20 lb., \$51; 12 and 14 lb., \$52; 8 and 10 lb., \$53, in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38, and open-hearth, \$40, per gross ton, Pittsburgh.

Sheets.—While the demand is perhaps not so urgent as 30 to 60 days ago, customers are insistent upon deliveries and are specifying freely against contracts. Shipments are held up because of shortage of cars and freight embargoes, and thousands of tons of sheets are piled in warehouses ready to ship to customers. Some consumers are trying to buy small lots in the open market to meet their wants until delayed shipments arrive, and this is helping to create high prices for sheets for prompt delivery. Customers are well covered over the first quarter and some over the first half. We quote blue annealed sheets, Nos. 3 to 8, at 4c. to 4.25c.; box annealed, one pass, Bessemer cold-rolled sheets, No. 28, 4.50c. to 5c.; No. 28 galvanized, 6.25c. to 7.50c.; No. 28 tin-mill black plate, 4.25c. to 4.50c., all f.o.b. mill, Pittsburgh. These prices are for carloads or larger lots, and the higher prices quoted are for reasonably prompt shipment.

Tin Plate.—Domestic demand is active, but not much attention is paid to the heavy foreign inquiry as the mills will need their entire output this year to take care of domestic trade. Several of the larger mills are practically sold up for all of this year, having taken large contracts for second half delivery at a price to be fixed later. Shipments are bad on account of the shortage in cars and motive power. On current orders for shipment from stock prices range from \$7 to \$8 per base box. We quote the market for delivery in the first half at \$7 to \$8 per base box, f.o.b. mill. We quote I. C.terne plate, 107 lb., at \$7.15 to \$7.65, and 200 lb. carrying 8-lb. coating, at \$11, the usual advances applying for heavier weights and coatings.

Shafting.—Some large contracts have been placed by leading consumers for delivery in the second quarter, prices ranging from 20 per cent to 15 per cent discount off list. Several makers of shafting have caught up to some extent on back orders and are now making shipments in 60 to 90 days from date of order. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—There is a fair demand for spikes from jobbers, but railroads are not buying and the market is quieter than for some time. Deliveries of both spikes and track bolts are bad on account of the car shortage. We quote track bolts with square nuts at 4.85c. to 5c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 10c. to 15c. We quote railroad spikes as follows: 9/16 in. and larger, \$3.40, base; 7/16 and 1/2 in., \$3.50, base; 5/16 and 3/8 in., \$3.75, base; boat spikes, \$3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Several of the larger makers that have been filling large export contracts for wire and wire nails have these pretty well cleaned up and are said to be seeking orders from the domestic trade more vigorously than for some time. The new demand and also specifications against contracts for wire and wire

nails in the holiday season were quiet, but mills report that the demand is now larger and specifications are coming in more freely. Nothing has been heard of the predicted advance in prices of wire products and some in the trade believe this may not be made. The market is very strong and in some cases premiums over regular prices are paid for nails and wire for fairly prompt shipment. Regular prices in effect at this writing are as follows: Wire nails, \$3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.95; galvanized wire, \$3.65; galvanized barb wire and fence staples, \$3.85; painted barb wire, \$3.15; polished fence staples, \$3.15; cement-coated nails, \$2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—Both export and domestic demand is heavy. Inquiries are in the market from Canada for upward of 25,000 tons. Several local makers have not sold any rods in the open market for some months, needing their entire output for their own finishing mills. Almost any price can be obtained for rods for fairly prompt shipment, the demand being heavier than the visible supply. We quote soft Bessemer, open-hearth and chain rods at \$75 to \$80 at mill, while \$90 or higher has been quoted for high carbon rods.

Iron and Steel Bars.—Specifications against contracts for both iron and steel bars are heavy, but new demand is only fair. Most consumers are covered over the first quarter and some over the first half of this year. The demand for steel bars from carbuilders is insistent, as deliveries by the mills are very unsatisfactory, due to shortage in cars and motive power. Some of the smaller manufacturing plants making nuts and bolts, rivets, etc., are not getting out more than 75 to 80 per cent of normal output, as they cannot get bars fast enough. The new demand for reinforcing bars in this district is light, as little new building is going on here at present. One leading steel bar mill that is sold up for first quarter is quoting 3c. to 3.10c. for second quarter delivery. The Carnegie Steel Company's price on steel bars is 3c. at mill, with no promise of delivery, while other mills are quoting 3c. to 3.25c. for second and third quarter shipment. We quote refined iron bars at 3.25c. and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Nuts and Bolts.—The new demand is fairly active, but most consumers are covered over the first quarter and some over the first half. Discounts are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 and 2 1/2 per cent; large, 30 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 per cent; small, cut thread, 40 and 10 per cent; large, 35 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 per cent; large, 30 per cent. Bolt ends, h. p. nuts, 35 and 5 per cent; with c. p. nuts, 30 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, \$2.50 off list, and tapped, \$2.30 off; nuts, c. p. c. and t. sq., blank, \$2.10 off, and tapped \$1.90 off; hex., blank, \$2.50 off, and tapped, \$2.30 off. Semi-finished hex. nuts, 50, 10 and 5 per cent. Finished and case-hardened nuts, 50, 10 and 5 per cent.

Rivets 7/16 in. in diameter and smaller, 40 and 10 per cent.

Rivets.—Domestic demand is fair, but export is heavy. An inquiry from London calls for 300 tons, and one local maker has recently shipped a half dozen carloads for export. Prices are very firm, as high as \$4.35 to \$4.45 being obtained for small lots. Makers quote buttonhead structural rivets, 1/2 in. in diameter and larger, \$4.25 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.35 per 100 lb., base, f.o.b. Pittsburgh.

Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Hoops and Bands.—Consumers are pretty well covered over the first quarter and some through the first half, and new demand is only fairly active. The nominal price of the Carnegie Steel Company on steel hoops is 3.50c., and on steel bands 3c., with extras on the latter as per the steel-bar card. Other mills that can ship fairly promptly are quoting 3.50c. to 3.75c. on hoops and up to 3.25c. on steel bands.

Cold-Rolled Strip Steel.—Consumers are getting anxious to cover on their needs for the second quarter, and the mills are expected to open their books soon for such contracts. In fact, it is stated that one leading maker has already done so. Consumers are specifying against first quarter contracts very freely. On current orders for reasonably prompt shipment makers quote \$7 for fair-sized quantities up to \$7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wrought Pipe.—It is reported, but not verified, that a local interest has taken a contract for 500 miles of 8-in. line pipe to parallel existing oil lines from the Oklahoma and Texas fields to the Gulf of Mexico. As indicating the scarcity of large pipe for prompt shipment, we can state that a mid-continental oil company in the market recently for 100 miles of 12-in. offered a mill \$7 per ton premium over list prices on the sizes wanted and the order was refused. The buyer then offered another mill \$10 premium for delivery within three months, and was unable to place the contract. The larger pipe mills are practically sold up for this year on lap-weld pipe, but on butt-weld sizes deliveries can be had in three to four weeks from date of order. Stocks of pipe held by jobbers are reported low and the demand on the mills for shipments is very urgent. Prices are firm and heavy premiums over regular prices would readily be paid for lap-weld pipe for fairly prompt delivery. Discounts are given on another page.

Boiler Tubes.—Makers of both iron and steel locomotive and merchant tubes have their output practically sold up for this year, and on some sizes of seamless tubes two large makers have all the business they can take care of in 18 months to two years. Published discounts are largely nominal, as premiums are readily paid to mills that can make anything like prompt shipments. Discounts are given on another page.

Coke.—The Baltimore & Ohio Railroad last week declared an embargo on all freight routed for points west of Pittsburgh, except engine fuel, Government freight and perishable goods. This means that probably thousands of loaded cars of both coal and coke cannot be moved, and makes the situation much worse. Early last week there was a slight betterment in the car movement, but it soon got worse. Both coal and coke are now moving very slowly. A heavy fall of snow has added to the troubles of blast furnaces. Prices on high grade furnace coke for prompt shipment range at present from \$8.50 to \$9 per net ton at oven. It is definitely known that \$8 per net ton at oven has been paid for high grade furnace coke for delivery in the first quarter. Furnaces having low-priced contracts for delivery in the first half of this year are not getting the coke and are buying in the open market. One coke interest is said to have completely repudiated its contracts, and several furnaces are threatening legal action against it. We quote best grades of furnace coke for prompt shipment at \$8.50 to \$9 per net ton at oven, while on contracts for first half delivery coke producers and dealers are quoting \$6 to \$7 per ton at oven. We quote foundry coke at \$10 for prompt and \$7 on contract. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Jan. 6 as 358,576 net tons, an increase over the previous week of 26,665 tons.

Old Material.—Hardly enough scrap is moving from dealers to consumers to establish market prices. Not much is pressing the market to find sale, but consumers seem to be filled up and for the time being are not interested. Dealers claim they are not anxious to sell at present prices, preferring to hold their scrap in the

belief the market will shortly be higher. Meanwhile, all grades of steel-melting scrap are off about \$1 per ton, and other grades about 50c. Sales of heavy steel scrap have been made to dealers at \$22. About the only new inquiry is for low phosphorus melting stock, a sale of 200 tons having been made late last week at about \$28, delivered. Prices for delivery in Pittsburgh and at other consuming points that take Pittsburgh freight rates, per gross ton, are nominally as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$22.00 to \$23.00
No. 1 foundry cast	19.50 to 20.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	25.00 to 26.00
Hydraulic compressed sheet scrap....	19.00 to 19.50
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	15.50 to 16.00
Bundled sheet stamping scrap.....	14.00 to 14.50
No. 1 railroad malleable scrap.....	19.50 to 20.00
Railroad grate bars	10.00 to 10.50
Low phosphorus melting scrap.....	28.00 to 29.00
Iron car axles	42.00 to 43.00
Steel car axles	42.00 to 43.00
Locomotive axles, steel	44.00 to 45.00
No. 1 busheling scrap	16.50 to 17.00
Machine-shop turnings	10.50 to 11.00
Old carwheels	19.00 to 20.00
Cast-iron borings	11.00 to 11.50
*Sheet-bar crop ends	24.00 to 25.00
No. 1 railroad wrought scrap.....	22.00 to 23.00
Heavy steel axle turnings.....	15.00 to 15.50
Heavy breakable cast scrap.....	17.00 to 17.50

*Shipping point.

The offices of the Wilkoff Company, dealer in pig iron, steel, iron and steel scrap, etc., have been removed from room 1301 to rooms 1312-1313 First National Bank Building, Pittsburgh, Pa.

Chicago

CHICAGO, ILL., Jan. 16, 1917.

The inquiry for both tank and ship plates stands out prominently in the demand now seeking consideration from the mills. The most vigorous canvassing of this market in the endeavor to secure quotations on one lot of 4000 tons and another of 8000 tons is noted. While activity in this direction is undiminished, new business in other finished steel lines is less pressing. Such new business as can be accommodated is perforce limited as to quantity and is usually attended with various substitutions of materials and changes in specifications. Rail inquiry is rendered important in connection with the needs of the Government for its Alaskan project and of the Grand Trunk Railway for its next year's requirements, in all involving about 75,000 tons. The pig-iron market is not active, although a number of transactions in both Northern and Southern iron for last half have been negotiated, while at least one interest, having available a considerable supply of iron for early delivery, is pressing for spot business. The scrap market is still without the support of consumer buying, but is also benefiting from the very limited quantities offered for sale. Purchases of steel scrap are being made for new open-hearth capacity in this market.

Pig Iron.—Buyers continue to show comparatively little interest in further purchases at this time, though there are, as always, those who have need of supplementing earlier contracts or who have to provide for a belated covering of requirements. Transactions of this character reported as closed in the last week are almost entirely in lots of a few hundred tons. There has been some inquiry from steel foundries for Bessemer iron and several sales have been made, the price approximating \$35, Valley furnace. Inquiry for Bessemer iron in quantity for export also persists, but there is less interest in this demand on the part of local furnaces. Some of the sellers of Southern iron are catering to such demand as may exist for spot and prompt shipment iron and with a round tonnage available for such delivery have made a number of sales aggregating several thousand tons. Prices are without change. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered

at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$31.75 to \$32.75
Lake Superior charcoal, No. 1.....	32.25 to 33.25
Lake Superior charcoal, No. 6 and Scotch	32.75 to 33.75
Northern coke foundry, No. 1.....	31.00 to 32.00
Northern coke foundry, No. 2.....	30.00 to 31.00
Northern coke foundry, No. 3.....	29.50 to 30.50
Northern high phosphorus foundry.....	27.00 to 28.00
Southern coke No. 1 f'dry and 1 soft	27.50 to 28.50
Southern coke No. 2 f'dry and 2 soft	27.00 to 27.50
Malleable Bessemer	31.00 to 32.00
Basic	31.00
Low phosphorus	50.00 to 55.00
Silvery, 8 per cent.....	38.50 to 39.00
Bessemer ferrosilicon, 10 per cent.....	46.50 to 47.00

Rails and Track Supplies.—For the Alaskan railroad the Government is seeking to place 25,000 tons of rails, and inquiry is also in the market for 50,000 tons for a Canadian railroad. No additional rail orders of size have been placed, though the estimate of requirements yet to be covered in this market exceeds 200,000 tons. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tie-plates, \$55 to \$60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open-hearth, \$40; light rails, 25 to 45 lb., \$44; 16 to 20 lb., \$45; 12 lb., \$46; 8 lb., \$47; angle bars, 2.25c.

Structural Material.—There is little demand for structural steel from mill and even less capacity available for its accommodation. The leading interest is declining to consider further business, as that would involve bookings for 1918, the current year being already more than filled. Some of the mills east of Pittsburgh appear able to quote for limited quantities on request, but only at premium prices. The lull in car buying continues. Contracts placed with fabricators last week involve no large amounts of plain material, the more important requirements being 420 tons taken by the American Bridge Company for the Spalding building in Chicago, 540 tons by the Stupp Bros. Bridge & Iron Works for the Rock Island Arsenal, 200 tons by the Indiana Bridge Company for the Vandalia Coal Company tipples and 300 tons by the Worden-Allen Company for bridges for the Wisconsin Highway Commission. We quote for Chicago delivery of plain material from mill 3.289c. to 3.689c.

We quote for structural steel out of jobbers' stocks at Chicago 3.85c.

Plates.—The inquiry for plates is unceasing. Demands both for tank quality and ship plates are sustained in volume unequalled by those for any other form of rolled steel. Local inquiry is largely for export, two of the larger specifications aggregating 4000 and 8000 tons respectively. The leading interest is out of the market, but another Western mill is in a position to take on some orders for tank plates for first half delivery. Eastern mills continue to quote on ship plates for first half delivery, prices ranging from 6c. upward. For tank plate the market ranges from 4.50c. to 5c., Pittsburgh. We quote for Chicago delivery of plates from mill, at its convenience, 3.789c. for prompt shipment; in widths up to 72 in., 4.689c. to 5.189c., and for wide plates, 4.939c. to 6.25c., depending upon deliveries.

We quote for Chicago delivery of plates out of jobbers' stocks 4.50c.

Sheets.—The business in sheets continues to show the restrictions placed upon it by mill conditions and high prices. Some of the mills, having capacity to roll sheets, are turning their steel to the filling of plate orders because of the more rapid handling of the latter product and the greater tonnage involved. We quote, for Chicago delivery, No. 10 blue annealed, 4c. to 4.50c.; box annealed, No. 16 and lighter, 4.50c. to 5c.; No. 28 galvanized, 6.50c. to 7c. These quotations are minimum prices for contracts. Early shipment quotations are \$5 to \$10 per ton higher.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 4.65c.; No. 28 black, 5.15c.; No. 28 galvanized, 7.25c.

Bars.—Some inquiry for mild steel bars is noted, largely for reinforcing purposes, but in a number of in-

stances the impossibility of securing this material has resulted in the substitution of iron, rail-carbon and discard steel bars. Buying of bar iron is intermittent, and local mills are refusing more business than they are accepting. We quote mill shipment, Chicago, as follows: Bar iron, 3c. to 3.25c.; soft steel bars, 3.189c. to 3.439c.; hard steel bars, 3c. to 3.25c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.75c.; bar iron, 3.75c.; reinforcing bars, 3.75c. base, with 5c. extra for twisting in sizes $\frac{1}{4}$ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent.

Rivets and Bolts.—Bolt and nut makers report inquiry from abroad for their products in quantities of considerable size. At the same time specifications against contracts from domestic customers are generally running in excess of the contract provisions. We quote as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 40-10; cut thread, 40-2 $\frac{1}{2}$; larger sizes, 30-5; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot pressed square nuts, 50; cut thread, 40-10; large size, 35-5; gimlet-point coach screws, 50; hot pressed nuts, square, \$2.50 off per 100 lb.; hexagon, \$2.60 off. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 4.15c., base, Chicago, in car load lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to $\frac{3}{4}$ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to $\frac{3}{4}$ x 6 in., 40-2 $\frac{1}{2}$; larger sizes, 30-5; hot pressed nuts, square, \$3, and hexagon, \$3 off per 100 lb.; lag screws, 50.

Cast-Iron Pipe.—A quiet week is reported by the pipe companies and new inquiry is limited. At Pontiac, Mich., 1200 tons will be bought, while Springfield, Ill., is also in the market. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$44.50; 6-in. and larger, \$41.50, with \$1 extra for class A water pipe and gas pipe.

Old Material.—Although the trading element in the scrap market is inclined to view the situation this week as more favorable to higher prices—a renewal of confidence largely due to the limited amounts of scrap that have come into the market under necessity of being sold—no quotable advances can be noted, and, in some cases, prices are even lower than last reported. The market is waiting for a resumption of interest on the part of buyers who thus far have appeared able to cover their immediate requirements by absorbing only what has been offered to them. For the requirements of the new open-hearth plant at Peoria a round tonnage of steel scrap has been purchased and the market is also expected to benefit from the new open-hearth capacity now going into operation, and projected, at Chicago. Railroad offerings of scrap for sale in this market are confined to a list of 900 tons from the Omaha. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$27.00 to \$28.00
Relaying rails	30.00 to 31.00
Old carwheels	19.00 to 20.00
Old steel rails, rerolling.....	27.00 to 28.00
Old steel rails, less than 3 ft.....	24.50 to 25.00
Heavy melting steel scrap.....	21.00 to 22.00
Frogs, switches and guards, cut apart	21.50 to 22.00
Shoveling steel	18.00 to 19.00
Steel axle turnings	13.50 to 14.00

Per Net Ton	
Iron angles and splice bars.....	\$26.50 to \$27.00
Iron arch bars and transoms.....	27.00 to 27.50
Steel angle bars	20.50 to 21.00
Iron car axles	36.00 to 37.00
Steel car axles	40.00 to 41.00
No. 1 railroad wrought.....	23.50 to 24.00
No. 2 railroad wrought.....	22.50 to 23.00
Cut forge	22.00 to 22.50
Pipes and flues	14.00 to 14.50
No. 1 busheling	17.00 to 17.50
No. 2 busheling	12.75 to 13.25
Steel knuckles and couplers	22.50 to 23.00
Steel springs	23.50 to 24.00
No. 1 boilers, cut to sheets and rings	13.00 to 13.50
Boiler punchings	18.50 to 19.00
Locomotive tires, smooth	23.00 to 23.50
Machine-shop turnings	9.50 to 10.00
Cast borings	9.00 to 9.50
No. 1 cast scrap	15.50 to 16.50
Stove plate and light cast scrap.....	11.50 to 12.00
Grate bars	13.00 to 13.50
Brake shoes	13.00 to 13.50
Railroad malleable	17.50 to 18.00
Agricultural malleable	14.75 to 15.25

Wire Products.—No further changes in the price of wire have been announced and we continue to quote

as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, \$3.239; wire nails, \$3.189; painted barb wire, \$3.339; galvanized barb wire, \$4.039; polished staples, \$3.339; galvanized staples, \$4.039, all Chicago.

Philadelphia

PHILADELPHIA, PA., Jan. 16, 1917.

Specifications continue to pour in on the steel mills for all manner of products, especially plates and ship material. It is estimated that orders for at least 150,000 tons of plates are pending, with one large mill which is short of steel trying to avoid taking further business. Inquiries calling for various steel products for Canadian delivery have been numerous in recent weeks, and it is the opinion of one firm having Canadian connections that Canada has about reached the limit of its capacity. The pig-iron market is quiet in foundry grades, but prices continue strong. Consumers are well covered for the first half, and users of foundry grades are not disposed to buy for the last half at present prices. Whatever slack there may be in the iron trade in recent weeks has been more than taken up by the crippling of deliveries. Consumers of Bessemer and low phosphorus iron are not showing any reluctance to buy ahead, despite prices. Standard low phosphorus continues to climb, sales having been made for both domestic and foreign delivery at \$57. The railroad situation is beginning to show improvement, and coke is consequently a little easier. Old material is quiet, but the export demand for some grades is growing.

Pig Iron.—New business is light, and the situation may be summed up by saying that most of the present effort is concentrated in hastening deliveries against existing contracts. Export inquiries continue to be received, especially for Bessemer and low phosphorus, but the sales are made elsewhere for the most part. Meanwhile prices are unchanged, except with low phosphorus, which is higher. The tone of the entire market is strong. For eastern Pennsylvania No. 2 X, \$30.84, Philadelphia, based on \$30, furnace, appears to be the minimum, while some small lots of one brand held at \$32.79, Philadelphia (\$32, furnace), have been taken. Prompt Virginia No. 2 X is held at \$29, furnace, or \$31.75, Philadelphia. Basic has been inactive, but the nominal quotation is firm at \$30, furnace. Makers of standard low phosphorus could sell far more than they have available; in fact, important producers are so heavily sold ahead that they are giving but slight attention to export inquiries as they come along. Last half standard low phosphorus has been taken, by both domestic and export buyers, at \$57, delivered, and quotations now range from \$55 to \$57, according to specifications. It is noted that consumers of low phosphorus and Bessemer are willing to contract to the end of the year, while users of foundry grades are disinclined to pay prevailing prices for deliveries far off. Most consumers are comfortably covered over the first half. Several inquiries for malleable are circulating, but it is most difficult to procure. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	\$30.00 to \$31.00
Eastern Pa. No. 2 plain	\$29.50 to 30.50
Virginia No. 2 X foundry	30.00 to 31.00
Virginia No. 2 plain	29.75 to 30.75
Gray forge	28.25 to 28.75
Basic	30.00
Standard low phosphorus	55.00 to 57.00

Ferroalloys.—The demand for prompt shipments of carloads and 50-ton lots of 50 per cent ferromanganese is good, and there are a few larger inquiries as yet unfilled. The domestic quotation is stronger, with \$175, delivered, quoted for any delivery. Foreign material is held at \$164 to \$165, seaboard, for delivery in the last three quarters of the year. The arrival of 506 tons from England was reported last week. Fifty per cent ferrosilicon is exceedingly difficult to find, and \$99 to \$100, Pittsburgh, the price last fixed by the producers, is purely nominal. For immediate shipment \$150, Pittsburgh, has been offered. For 500 tons of first-half 11 per cent Bessemer ferrosilicon, \$47.50, furnace, equal

to \$50.94, Philadelphia, was paid, and for some semi-Bessemer, \$1 less. It is scarce for early shipment.

Plates.—The situation shows no change. A mill which is heavily loaded with orders complains of a scarcity of steel, and is trying to avoid taking more business. Lack of materials, both for manufacture and repairs, is keeping down its production in a tantalizing way, it being able, at last reports, to operate only 12 out of 16 open-hearth. It has turned down a large Japanese inquiry. Its quotations are 4.909c., Philadelphia, for universal plates, 5.159c. for tank plates, and 6.159c. for ship steel. Other makers quote 4.909c. for tank and 6.159c. for ship plates. Italian interests placed 3000 to 4000 tons of ship steel at 6c., Pittsburgh, for plates, and 4c. for shapes. Some Japanese inquiry is still pending. More export business probably would have been placed in the week were it not for the holding up of cables. Export and domestic inquiries aggregate about 150,000 tons, all as yet unsatisfied, and this total is augmented by many small inquiries. An inquiry, understood to be English, calls for about 50,000 tons; Russian car requirements are about 20,000 tons; the New York subway will take about 17,000 tons, and miscellaneous needs total about 20,000 tons. The demand for ship plates is the heaviest.

Billets.—Steel for nearby delivery is as scarce as ever, with \$60 quoted for soft open-hearth rerolling billets, and \$75 to \$80 for forging steel. A domestic manufacturer inquired in the week for about 10,000 tons of 6-in. shell steel.

Bars.—The quotation for steel bars is nominally 3.409c., Philadelphia, but business is placed up to 3.659c. Iron bars are unchanged at 3.159c., Philadelphia, car-load lots.

Structural Material.—Specific propositions are confined to the several large ones referred to a week ago. The plans for the League Island Navy Yard improvements are before the trade. The smaller inquiry continues active, and quotations are unchanged at 3.659c., Philadelphia. For ship shapes, 4.159c. is asked. Several hundred tons of tees for shipment to Canada have been placed at 3.50c., Pittsburgh.

Sheets.—The market is strong at 4.909c., Philadelphia, for No. 10 blue annealed. Premiums have been paid, especially for No. 28.

Old Material.—The market continues quiet, with a lower tendency in some kinds of material. An export demand is developing for axles, heavy melting steel, shafting and high-grade wrought scrap. In heavy steel the feeling is a little easier, but the quotation has not dropped below \$22. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel	\$22.00 to \$22.50
Old steel rails, rerolling	30.00 to 31.00
Low phos. heavy melting steel scrap	33.00 to 36.00
Old iron and steel axles (for export)	43.00 to 45.00
Old iron rails	28.00 to 29.00
Old carwheels	21.50 to 22.00
No. 1 railroad wrought	27.00 to 28.00
Wrought-iron pipe	18.00 to 19.00
No. 1 forge fire	15.00 to 16.00
Bundled sheets	15.00 to 16.00
No. 2 busheling	13.00 to 14.00
Machine-shop turnings	12.75 to 13.25
Cast borings	13.75 to 14.25
No. 1 cast	20.00 to 21.00
Grate bars, railroad	16.00 to 16.50
Stove plate	17.00 to 17.50
Railroad malleable	18.50 to 19.00

Coke.—The market is easier because of a slightly better movement of freight cars. Spot furnace has been sold at \$8.50 per net ton at oven, but up to \$9.50 is asked. Contract furnace is quoted at from \$6 upward. Prompt foundry is held at \$10 to \$10.50, and contract at \$5.50 to \$7.50, one interest asking \$8.50 for the first half. All quotations continue uncertain, being subject to change from day to day. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Cinder and Scale.—The principal part of the mill cinder and scale business for the year has been concluded in eastern Pennsylvania. The cinder was taken at prices 50c. to 75c. per ton higher than prevailed last

year, or at \$4 to \$4.50 per ton. The scale went at \$1 to \$1.50 per ton higher than last year, or at \$6 to \$6.50 per ton. Special lots of scale brought \$7. In this district probably 200,000 tons of cinder and scale are bought and sold annually.

Buffalo

BUFFALO, N. Y., Jan. 16, 1917.

Pig Iron.—Although inquiry continues to be of fair amount and seems likely to increase in volume, principally for first half delivery, sales are limited. The furnaces have very little available iron to dispose of, being filled with orders approximately to capacity for many months ahead; some of them being almost entirely sold up for the last half. One furnace is out of the market altogether until the last half and is not now quoting. At present there is no apparent interest on the part of buyers for last half delivery. Practically the only iron obtainable by users in this district, in any considerable quantities and for reasonably prompt delivery, comes from other producing sections, including some Southern iron. Shipments from furnaces are greatly hampered by the almost universal embargoes now in force. The prices now being quoted by the furnaces of the district, and which have been quoted for some time, are more in the nature of "stop-sale" prices, than an indication of the prices at which orders for iron have been placed on the furnace books. The furnaces of the district were completely sold up, prior to the time the market reached these prices, and the figures of \$20.50 to \$30 more nearly represent the prices now being charged by the furnaces for the business which they had previously booked. The flat price of \$35 at furnace for all grades continues to be named but there is no iron obtainable from the furnaces of the district at that or any other nominal figure. We quote as follows for local iron for first quarter and first half delivery, f.o.b. furnace, Buffalo:

High silicon irons.....	\$35.00 to \$35.50
No. 1 foundry	35.00 to 35.50
No. 2 X foundry	35.00 to 35.50
No. 2 plain	35.00 to 35.50
No. 3 foundry	35.00 to 35.50
Gray forge	35.00 to 35.50
Malleable	35.00 to 35.50
Basic	35.00 to 35.50
Bessemer	35.00 to 35.50
Charcoal, according to brand and analysis	35.50 to 36.00

Finished Iron and Steel.—Consumers of finished material are being seriously affected by traffic conditions, especially on movement into Canada. Many cars of materials which left the Pittsburgh district in the early part of December are being held in and around Buffalo. This results in constant appeals from customers to suppliers of steel to trace cars, and many factories are threatened with the necessity of closing down because of a deficient supply of material. Renewed interest is being shown in steel products, especially bars and plates. A number of inquiries found their way into the market the past week, and some sales of bars have been made for shipment at the mill's convenience at 3c., base, with prompt specification. It is understood some of the sales agencies are offering contracts to their established customers, to be specified during the second quarter, and that the price named is an advance of several dollars per ton over the present market price. Several large inquiries for ship plates are still in the market for shipment in 1917, but are unable to find placement on mill books. An inquiry for 12,000 tons of bars and shapes is reported for Canadian use. The John W. Cowper Company, Buffalo, has contract for the erection of an addition to the fabricating plant of the Ferguson Steel & Iron Company, Buffalo, requiring about 700 tons of structural steel.

Old Material.—Foreign demand for heavy melting steel is still a leading factor in the market here, and a large export inquiry for that commodity that has been before the market for several weeks is yet unsatisfied. Aside from export demand, little new business has developed. Some consumers have placed embargoes on scrap for the time being, the tendency being to clean up on shipment of old orders and relieve the car situa-

tion before taking on more scrap. All dealers appear to have high-priced orders still on their books and are endeavoring to ship against them, consequently there is no inclination to reduce prices, which are firmly held except in a few emergency cases where embargo prevents delivery to original consignee and shipments have to be diverted, necessitating reduction in price. Such concessions, however, are not yet of sufficient proportions to affect prevailing asking prices, there being no disposition on the part of dealers to sell from stock at recession prices, but rather to await the hoped-for resumption of buying by users. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$26.00 to \$27.00
Low phosphorus	32.00 to 34.00
No. 1 railroad wrought.....	30.00 to 31.00
No. 1 railroad and machinery cast.....	23.00 to 24.00
Iron axles.....	45.00
Steel axles	45.00
Carwheels	23.00 to 24.00
Railroad malleable	23.00 to 24.00
Machine shop turnings	11.50 to 12.00
Heavy axle turnings	17.50 to 18.00
Clean cast borings	11.50 to 12.00
Iron rails	25.00 to 26.00
Locomotive grate bars	15.50 to 16.00
Stove plate	16.00 to 16.50
Wrought pipe	17.00 to 17.50
No. 1 busheling scrap.....	21.50 to 22.50
No. 2 busheling scrap	15.00 to 15.50
Bundled sheet scrap.....	15.00 to 16.00

Cincinnati

CINCINNATI, OHIO, Jan. 17, 1917.—(By Wire.)

Pig Iron.—Buyers are still holding off. A few inquiries for malleable were made last week for prompt shipment, but it was impossible to pick up any with analysis conforming to requirements named. Quite a number of sales of special foundry iron were made recently but only in a few instances did any of the orders exceed 200 tons. Prices are unchanged, but a few purchases of Southern special iron were made below \$24, Birmingham basis, for No. 2, all for nearby delivery. The last half Southern quotation remains \$23, Birmingham, but a few furnaces are holding at a higher figure for such shipment. Ironton producers are all quoting \$30 at furnace for any shipment this year, but little iron can be had in that district for movement before July 1. The freight embargo situation is clearing up to some extent but the recent severe weather has had an adverse effect in the movement of cars. However, no foundries in this district have suffered for the want of pig iron and they are all now more concerned in being able to get a coke supply. No late inquiries for basic have appeared and it is now quoted in nearly all producing districts on the same basis as No. 2 foundry. The Ohio silvery irons are inactive but firm at the quotations given below. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$26.40 to \$28.40
Southern coke, No. 2 f'dry and 2 soft.....	25.90 to 27.90
Southern coke, No. 3 foundry.....	25.40 to 27.40
Southern coke, No. 4 foundry.....	24.90 to 25.40
Southern gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon.....	37.25 to 38.25
Southern Ohio coke, No. 1.....	31.76
Southern Ohio coke, No. 2.....	31.26
Southern Ohio coke, No. 3.....	30.76
Southern Ohio malleable Bessemer.....	31.26
Basic, Northern	31.26
Lake Superior charcoal	28.70 to 29.70
Standard Southern carwheel.....	27.90 to 28.40

(By Mail)

Coke.—Although freight embargoes on a number of railroads were temporarily lifted last week, weather conditions have again interfered with shipments and high prices have been obtained for prompt foundry coke. Some foundry coke is bringing \$10.50 to \$12.50 per net ton at oven for prompt shipment. No general quotations are out for shipment through the entire year, and prices for future contracts range all the way from \$5 to \$7.50 for 72-hr. coke in the Connellsville, Wise County and Pocahontas fields. Furnace coke for prompt shipment is scarce, and quotations vary on contract business from \$4.50 to \$5.50 per ton at oven.

Finished Material.—The high cost of sheets has disturbed the roofing business, and the demand from that

source is light. However, there is a call for galvanized sheets from other sources that keeps up remarkably well. Black sheets are quoted all the way from 4.90c. to 5.05c., f.o.b. Cincinnati or Newport, Ky., and No. 28 galvanized from 6.65c. to 6.90c. Both the mill and present warehouse quotation on No. 10 blue annealed sheets is the same at 4.65c. We quote from warehouse stocks as follows: Wire nails, \$3.40 per keg, base; barb wire, \$4.40 per 100 lb.; structural shapes, 3.90c.; plates, 4.70c.; steel bars, 3.80c., and round head rivets, 4.50c. Warehouse business is holding up fairly well and the demand from the hardware trade is improving.

Old Material.—Practically all wrought scrap is in good demand, but the different grades of cast have not quite kept on the same level. While all prices are weak, no changes of consequence can be made. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	\$14.00 to \$14.50
Old iron rails	24.25 to 24.75
Relaying rails, 50 lb. and up.	27.75 to 28.25
Revolving steel rails	24.25 to 24.75
Heavy melting steel scrap	20.25 to 20.75
Steel rails for melting	20.25 to 20.75
Per Net Ton	
No. 1 railroad wrought	\$21.00 to \$21.50
Cast borings	6.50 to 7.00
Steel turnings	6.50 to 7.00
Railroad cast	15.75 to 16.75
No. 1 machinery cast	17.50 to 18.00
Burnt scrap	9.75 to 10.25
Iron axles	32.50 to 33.00
Locomotive tires (smooth inside)	27.00 to 27.50
Pipes and flues	13.25 to 13.75
Malleable cast	14.75 to 15.25
Railroad tank and sheet	11.75 to 12.25

Birmingham

BIRMINGHAM, ALA., Jan. 15, 1917.

Pig Iron.—The Birmingham market continues to range from \$23 to \$25, the former price being the regular customer quotation of two interests for second half delivery and the latter that for small lots spot delivery. The general average for immediate delivery is around \$24, and this is more generally quoted for second half than \$23. One seller the past week made a number of bookings both North and South for second and third quarters at \$24, and sold some high silicon iron at \$26.50. The Alabama Company quotes \$24 for foundry for all of 1917 and \$26 to \$27 for its Clifton high silicon. On foreign business this company has obtained \$25. Several foreign inquiries were received the past week. The largest foundry producer is on a strictly \$24 basis for all deliveries, and made several sales in the week on that basis, one being for 1500 tons. As a rule a light business is reported, but there are indications of an early buying movement. It is believed, nevertheless, that prices have reached top. The Matthews Iron Company will shortly begin operations at its Silver Run stack near Rome, Ga., making a high manganese and low phosphorus iron. Capacity is booned for several months. The Sloss-Sheffield has about completed the twin stack of the Hattie Ensley in Sheffield, but will not operate until the Lady Ensley goes out. These two stacks are so arranged as to allow a continuous operation of one. The small Williamson furnace in Birmingham will be scrapped. There is no further talk of additional furnace operations by the Alabama Company. All furnace interests report the coke situation as improved, owing to the bringing in of additional idle beehive plants. Free foundry stocks are understood to range around the same figures as for several months, which is the equivalent of saying that the record output of furnaces has been moved out. New records are reported at steel plants, that of the open-hearth mill of the Tennessee Company at Ensley for 24 hr. having reached 4250 tons. We quote, per gross ton, f.o.b. Birmingham district, furnaces, as follows:

No. 1 foundry and soft	\$24.50 to \$25.50
No. 2 foundry and soft	24.00 to 25.00
No. 3 foundry	23.50 to 24.50
No. 4 foundry	23.25 to 24.25
Gray forge	23.00 to 24.00
Basic	24.50 to 25.50
Charcoal	25.00 to 26.00

Coal and Coke.—The car shortage, although still

acute, is not as much so as it has been. Annual contracts for coal that have been recently renewed are understood to have been on a basis of \$1.75 to \$2 f.o.b. per net ton, mines, for steam coal. This compares with an average the past two years of around \$1.15. The Seaboard Air Line has awarded an 18-months contract for 180,000 tons (renewal) to the Alabama Company. Coal mines are active and mine enlargements and improvements are taking place on a larger scale. Contracts for coke with regular customers and for periods of several months are being made as high as \$8 per net ton at oven. Spot coke is bringing from \$10 to \$12. These prices apply to standard beehive foundry. The tendency is to advance further. The output is at a maximum. Furnace coke brings \$4.50 to \$5, but the quantity is negligible.

Cast-Iron Pipe.—The booking of an order for 1500 tons by the National Cast Iron Pipe Company at St. Paul was the leading event of the week. The American Cast Iron Pipe Company will build a two-mile railroad to haul molten iron from the furnaces of the Republic Company to its North Birmingham pits, the experiment in the use of hot metal having been successful. A fair sprinkling of orders, in spite of high prices, was stimulating. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$39; 6-in. and upward, \$36, with \$1 added for gas pipe and special lengths.

Old Material.—The chief feature of the scrap market has been a tendency to stiffen the prices recently lowered. A fair volume of steel scrap has changed hands. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	\$34.00 to \$36.00
Old steel rails	19.00 to 19.50
No. 1 wrought	18.00 to 19.00
Heavy melting steel	16.00 to 16.50
No. 1 machinery	17.00 to 18.00
Carwheels	14.00 to 15.00
Tram carwheels	14.00 to 15.00
Stove plate and light	10.50 to 11.00

San Francisco

SAN FRANCISCO, CAL., Jan. 9, 1917.

With stock-taking completed, the general tonnage of steel in merchants' hands is found to be much greater than usual at this time of year, though stocks are considerably broken in certain lines. Manufacturers also are carrying fairly large stocks, as a rule, but are buying freely for both immediate and future delivery. Business was resumed actively immediately after the holidays, and the feeling in the trade is fully as confident as at any time in the past year. Pacific coast requirements are unlikely to be curtailed by the end of the war. Export demand is strong, and numerous small export orders are placed with jobbers at high prices.

Bars.—With the freight advance, and with less desire to sell on the part of outside mills, the market has stiffened up materially. The principal needs of large buyers for first quarter or first half are fairly well covered by contracts, but local mills have raised their prices sharply for new business for that period, asking 3.50c. to 3.60c. Foreign inquiries continue large, and mills show less desire for this business. The movement of reinforcing material is heavy for this time of year with good prospects for the spring. The small jobbing business has picked up well, and prices for soft steel bars in small lots have been advanced to 4.35c., or 4.85c. for sizes not made by local mills.

Structural Material.—Prices are having a more pronounced effect on the letting of new work, and several important jobs are known to have been held up on this account, some of the contracts being turned to reinforced concrete. Plans are ready for a six-story building at Fresno, Cal., and for a steel bridge of four 200-ft. spans at Sandpoint, Idaho. Small work is still appearing in fair volume, but contracts come through less readily. Some fabricators have fair stocks, but few have much tonnage under contract, and the difficulty of placing new orders is another retarding factor. Manufacturers' needs continue exceptionally heavy, but for the most part are covered for some time to come.

Plain shapes in small lots from store are held at about 4.60c.

Rails.—The placing of large contracts by the trans-continental lines is of only casual interest here, such business going to the mills direct. Light rails are moving well, both locally and for export, and there are indications of an increasing demand.

Plates.—The Southern California Edison Company has been taking figures on penstock work requiring 2500 tons, but the closing may be delayed a little. Ship-builders and other large consumers have contracted for a heavy tonnage for distant delivery, and are buying much more than usual from merchants to cover short sizes, while the routine demand from tank and boiler shops is also strong. Tank plates in small lots from store are held at 5.50c.

Sheets.—Galvanized sheets are quoted on the basis of 6.75c., Pittsburgh, and the local jobbing price is 8.34c. These prices have cut down local demands to a minimum, though a fair tonnage is still being taken for manufacturing and building work. There is a strong foreign demand, however, especially for corrugating sizes, and export sales have been made from store at extreme prices. Stocks are light and somewhat broken. Blue annealed are moving well, the jobbing price on No. 10 being 5.65c.

Wrought Pipe.—There is no great activity except in oil-field goods, which continue in strong demand, with an unusual amount of new drilling. The call for merchant sizes is about normal, last year's local tonnage as reported by important interests being slightly larger than for the previous year, with a fairly steady movement. Boiler tubes are scarce, with a heavy export demand with which nothing can be done.

Cast-Iron Pipe.—Business is decidedly dull, the last advance having caused a general suspension of buying. Local corporations have many large improvements planned for the year, but are unwilling to buy except for actual necessities under present conditions. Prices are quoted here at \$49 per net ton for 6-in.; \$52 for 4-in., and \$1 extra for class A and gas pipe.

Pig Iron.—Foundry operations are steady and on a larger scale than ever, although operators feel some trepidation as to the continuation of demand for their products at present costs. Confidence, however, appears to be gaining ground, and there is more inquiry for second and third quarter iron. Small sales for current shipment are also more numerous. No. 1 foundry iron is quoted at about \$36 per gross ton.

Coke.—Orders for prompt delivery are coming up in better shape, and some contracts are being closed, though buyers are still a little offish. Values are too unsettled to make a definite quotation possible, as high as \$21 per net ton having been paid recently.

Ferroalloys.—The general demand is on the increase. Ferrosilicon has been slightly higher since the holidays, while ferromanganese shows little change, the local output being an increasing factor in the market.

Old Material.—Recent quotations on pig iron have caused an increased demand for cast-iron scrap, with a resulting jump in price. While some offerings can still be had at \$16, or possibly even less, heavy machinery scrap which can be used with a minimum of pig iron is at a premium, and some holders are demanding \$23 per net ton. Steel melting scrap remains quite firm at \$11 to \$15 per gross ton, with reports of some sales of desirable material even higher; though the largest buyers are pretty well supplied for the present.

The municipal free bridge at St. Louis, which has been under construction seven years and one month, to the day of opening, will be thrown open to the public Jan. 20. The bridge was built by the city as a means of overcoming the "bridge arbitrary" on freight which has been levied by roads entering the city from the East as a charge for the facilities provided by the bridges under the control of the Terminal Association. The original authorization and bond issue were voted in June, 1906, and the second and completing issue in November, 1914.

St. Louis

ST. LOUIS, Mo., Jan. 15, 1917.

Pig Iron.—Some renewed interest developed as a result of a number of inquiries and at least one large sale. The inquiries include 300 tons of No. 1 Northern and 1000 tons of No. 2 Southern foundry, while the sale referred to was 12,000 tons of Southern basic for forward delivery.

Coke.—The labor and car shortage has resulted in sales in the week at \$12 for prompt shipment on best selected 72-hr. foundry Connellsville district coke. The sold-up condition of by-product coke ovens is keeping that source of supply out of the market.

Finished Iron and Steel.—None of the interests represented here is yet willing to consider future business. All classes of material are being urged forward on such contracts as exist. Movement out of warehouse is free at the high prices which are quoted and which seem to have no deterrent effect. For stock out of warehouse we quote as follows: Soft steel bars, 3.80c.; iron bars, 3.70c. to 3.75c.; structural material, 3.90c.; tank plates, 4.55c.; No. 10 blue annealed sheets, 4.70c.; No. 28 black sheets, cold rolled, one pass, 5.30c.; No. 28 galvanized sheets, black sheet gage, 7.50c.

Old Material.—Buying at present is by dealers who are covering shortages. There is no immediate new demand for material from consumers, and it is not expected that there will be any for a time. Lists out include 300 tons from the Kansas City Terminal, 250 tons from the Cotton Belt, 1000 tons from the Chicago, St. Paul, Minneapolis & Omaha, and 2500 tons from the Southern Railway. Severe weather and the cleaning up of scrap supplies in the recent runaway market account for the decreased listings of railway material. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$26.00 to \$26.50
Old steel rails, re-rolling	26.50 to 27.00
Old steel rails, less than 3 ft.	27.00 to 27.50
Relaying rails, standard section, subject to inspection	33.00 to 34.00
Old carwheels	18.50 to 19.00
No. 1 railroad heavy melting steel scrap	22.00 to 22.50
Heavy shoveling steel	19.00 to 19.50
Ordinary shoveling steel	17.50 to 18.00
Frogs, switches and guards cut apart	22.00 to 22.50
Bundled sheet scrap	13.50 to 14.00

Per Net Ton	
Iron angle bars	\$26.00 to \$26.50
Steel angle bars	21.00 to 21.50
Iron car axles	36.50 to 37.00
Steel car axles	37.50 to 38.00
Wrought arch bars and transoms	27.50 to 28.00
No. 1 railroad wrought	22.50 to 23.00
No. 2 railroad wrought	21.50 to 22.00
Railroad springs	23.50 to 24.00
Steel couplers and knuckles	24.00 to 24.50
Locomotive tires, 42 in. and over, smooth inside	26.00 to 26.50
No. 1 dealers' forge	17.00 to 17.50
Cast iron borings	8.00 to 8.50
No. 1 busheling	15.50 to 16.00
No. 1 boilers, cut to sheets and rings	13.00 to 13.50
No. 1 cast scrap	14.00 to 14.50
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	15.50 to 16.00
Agricultural malleable	13.50 to 14.00
Pipes and flues	13.50 to 14.00
Heavy railroad sheet and tank scrap	13.50 to 14.00
Railroad grate bars	11.50 to 12.00
Machine shop turnings	9.00 to 9.50
Heavy axle and tire turnings	12.50 to 13.00

New York

NEW YORK, Jan. 17, 1917.

Pig Iron.—Transactions in foundry iron are rare and in small lots. Here and there some resale iron has appeared, because of failure to secure or connect with cargo space at Atlantic seaboard. In the quietness of the market these sales have attracted considerable attention. The concessions on these sales have been slight, and they have generally been followed by negotiations for later delivery iron, to take the place of that which has gone on the market. In one instance 10,000 tons of December iron came on the market at Chicago, being held because of failure to specify to the railroads the name of the steamer which was to carry the iron. Furnaces differ in their policy as to stirring up business for the second half. For the most part

buyers are showing less interest in iron for such delivery than was the case in November and early December. A sale of 10,000 tons of standard Bessemer iron has been made to J. P. Morgan & Co. for export by a Pennsylvania furnace. Delivery has already started. One lot of 300 tons of high silicon Bessemer has been made at \$41, delivered New York. There is little offering of warrant iron. The coke market is not quite so stiff on spot shipments, and \$10.50 to \$11 at oven for foundry coke has been done. Rather more spot coke is available than was the case recently. We quote at tidewater for early delivery: No. 1 foundry, \$31; No. 2X, \$30 to \$31; No. 2 plain, \$29 to \$30; Southern iron at tidewater, \$30 for No. 1 and \$29 to \$30 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Inquiries for ferromanganese are very few, except for small lots for early shipment. A few sales of carload and 50-ton lots of the domestic alloy have been made at \$175, delivered, but there is a decided absence of interest in large quantities. The quotation for British ferromanganese is unchanged at \$164, seaboard. Arrivals are reported to be moderate. Data furnished THE IRON AGE indicate that the imports for December will not be much in excess of 4500 tons, which is the lowest in some months. An inquiry is pending for 2000 tons of spiegeleisen, which is quoted at \$55 to \$60, furnace. Ferrosilicon, 50 per cent, is very strong and active at \$99 to \$100 on contract with material for early delivery commanding \$115 to \$120 per ton, delivered.

Finished Iron and Steel.—Another large tonnage structural project to come up for early consideration involves 10,000 tons for a bridge for the Atlantic Coast Line over the James River. Two new sizable buildings have also appeared on the market, one a 1100-ton apartment, 143 East Thirty-ninth Street, and the other a 2500-ton loft at Broadway and Twenty-first Street for the Bradish-Johnson Estate. There is no end to the offerings on steel for export, still chiefly for shipbuilding purposes, but as regards war steel in the form of billets or shell forgings, the buyers seem to be jockeying apparently in the interest of securing lower prices. It appears in some cases, at least, that new business may be taken for delivery after July 1 if the prices on existing contracts are accepted, but makers want higher prices because of steel and labor costs. In quotations on shipbuilding material, 4c. on the structural shapes is coming to be as common as 6c. for the plates. Cable acceptances on a considerable tonnage of ship material are still delayed with no satisfactory explanation. Mills generally do not seem to have changed their attitude with regard to making commitments for far forward deliveries and the price situation remains strong. The movement out of warehouse is brisk, with December normally quiet a record breaker with some warehouses. We quote mill shipments of shapes in two to five months at 3.419c. to 3.669c., New York; at convenience of the mill 3.269c. New York, and warehouse shipments at a minimum of 3.95c., New York. We quote universal and ordinary tank plates at 4.669c. to 5.169c., New York, but ship plates at 5.169c. to 6.169c., and late 1917 plates at 3.769c., New York. Out of store we quote 4.75c., New York, for plates under 36 in. in width and 5c. on wider plates. We quote mill shipments of steel bars at 3.169c. to 3.669c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, three months. We quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are again \$2 per ton higher, or 3.70c., and steel bars are 3.85c., New York.

Cast-Iron Pipe.—The city of Baltimore opens bids to-day on the general requirements of the water department to June 30, 1917, with no mention of a definite quantity. Municipal lettings are few at present, and the volume of private business is diminishing. Quotations are maintained on the basis of \$41.50 per net ton, tidewater, for carload lots of 6-in., class B and heavier, with class A and gas pipe taking an extra of \$1 per ton.

Old Material.—Export inquiries call for considerably larger quantities than domestic business. Much difficulty is found in filling export orders, however, because of the inability of railroads to make satisfactory de-

liveries at the seaboard, as well as trouble in making vessel arrangements so that immediate connection can be had in transferring from car to ship. If transportation conditions were easy the export movement would undoubtedly be large. Dealers report domestic consumers doing little at present, and they are not expected to be actively in the market for some time. Prices are naturally soft. Brokers name nominal buying prices as follows to local dealers and consumers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment).....	\$19.00 to \$19.50
Old steel rails (short lengths) or equivalent	20.00 to 20.50
Relaying rails	37.00 to 38.00
Revolving rails	27.50 to 28.00
Iron and steel car axles (for export) ..	43.00 to 45.00
No. 1 railroad wrought	25.00 to 26.00
Wrought-iron track scrap	21.50 to 22.00
No. 1 yard wrought, long	21.00 to 21.50
Light iron (nominal)	4.50 to 5.00
Cast borings (clean)	10.50 to 11.00
Machine shop turnings	9.50 to 10.00
Mixed borings and turnings (nominal) ..	8.00 to 8.50
Wrought pipe (not galvanized or enameled)	15.50 to 16.00

Foundries are only buying in small quantities. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast	\$19.50 to \$20.00
No. 2 cast	17.50 to 18.00
Stove plate	14.50 to 15.00
Locomotive grate bars	14.50 to 15.00
Old carwheels	20.00 to 20.50
Malleable cast (railroad)	18.00 to 18.50

British Steel Market

Active Domestic Demand for Pig Iron—Ferromanganese Firm

LONDON, ENGLAND, Jan. 17, 1917. (By Cable)

The pig-iron market is moderately active with a large domestic demand for hematite iron, but export permits are restricted. American semi-finished steel is nominally unchanged and transactions are difficult to put through. Wire rods are quoted at £26 upwards, c.i.f. Liverpool, for forward shipment. Tin plates are lifeless with stock plates quoted at 33s. Ferromanganese is firm. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 34s. 6d.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s.
Hematite pig iron, f.o.b. Tees, 142s. 6d.
Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.
Ferromanganese, £34 to £36 and upward.
Ferrosilicon, 50 per cent. c.i.f., £29 10s.

Charcoal Blast Furnace for Mysore, India

A charcoal blast furnace with arrangements for recovering the by-products in making the charcoal and possibly also for utilizing excess power of the blast furnace to make calcium carbide from the fines of the charcoal not suitable for the blast furnace, is to be built for the State of Mysore, India. The plans contemplate a furnace capable of producing about 20,000 tons of iron annually, and the furnace is to be equipped with a turbo blower and four hot-blast stoves. With a water-tube boiler installation to utilize the blast-furnace gases, electric generating machinery may be added, and the electricity credited to the surplus waste gases of the furnace can be applied to a mixture of lime and the otherwise waste charcoal to form the calcium carbide. The retort plant for the charcoal (from native hardwoods) will produce alcohol and acetate of lime.

The available iron ore averages about 60 per cent metallic iron, with phosphorus at 0.07 to 0.10 per cent, and it was concluded that for the present at least the commercial advantage lies in making an iron which would have an appreciable market in the casting of chilled rolling-mill rolls for the Tata Iron & Steel Company, the Imperial Steel Works of Japan, and the Han Yeh Ping Company, Hankow, China. Charles P. Perin, New York, is consulting engineer.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths under 1 ft.	.155
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.60c. to 5c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. E. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.	
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$75 to \$80.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed,

\$2.95; galvanized, \$3.65. Galvanized barb wire and staples, \$3.85; painted, \$3.15. Wire nails, \$3. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Dec. 29, 1916, all full weight:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8	57	30 1/2	1/8 and 1/4	46	19
1/2	61	46 1/2	3/8	47	20
3/4 to 3	64	50 1/2	1/2	51	33
			3/4 to 1 1/2	54	40
Lap Weld			Butt Weld		
2	57	44 1/2	1 1/4	40	25
2 1/2 to 6	60	47 1/2	1 1/2	46	32
7 to 12	57	43 1/2	2	47	33
13 and 14	47 1/2	..	2 1/2 to 4	49	36
15	45	..	4 1/2 to 6	49	36
			7 to 12	48	35
Reamed and Drifted			Lap Weld, extra strong, plain ends		
1 to 3, butt	62	48 1/2	1/4 to 1 1/4, butt	49	32
2, lap	55	42 1/2	1 1/4, lap	35	19
2 1/2 to 6, lap	58	45 1/2	1 1/2, lap	41	26
			2, lap	42	27
			2 1/2 to 4, lap	45	30
Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
1/8, 1/4 and 3/8	53	35 1/2	1/4	42	37
1/2	58	45 1/2	1 1/2	47	33
3/4 to 1 1/2	62	49 1/2	2	49	36
2 to 3	63	50 1/2	2 1/2 to 4	51	39
			4 1/2 to 6	50	38
			7 to 8	44	32
			9 to 12	39	27

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4 1/2 in. steel from Nov. 20, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1 1/4 in.	31
1 1/2 and 2 in.	43
2 1/4 in.	40
2 1/2 and 2 3/4 in.	46
3 and 3 1/4 in.	46
3 1/2 to 4 1/2 in.	46
5 and 6 in.	45
7 to 13 in.	42
1 1/4 in.	33
1 1/2 and 2 in.	35
2 1/4 in.	32
2 1/2 and 2 3/4 in.	38
3 and 3 1/4 in.	43
3 1/2 to 4 1/2 in.	44
5 and 6 in.	37
7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1 1/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets	Cents per lb.
Nos. 3 to 8	4.00 to 4.25
Nos. 9 to 12	4.10 to 4.25
Nos. 13 to 16	3.75 to 4.00
No. 17 and lighter gages are based on \$4.50 per 100 lb. for No. 28 Bessemer black sheets.	3.85 to 4.10

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	4.30 to 4.55
Nos. 22 and 24	4.35 to 4.45
Nos. 25 and 26	4.40 to 4.65
No. 27	4.45 to 4.70
No. 28	4.50 to 4.75
No. 29	4.55 to 4.80
No. 30	4.65 to 4.90

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	5.25 to 5.75
Nos. 12 to 14	5.35 to 5.85
Nos. 15 and 16	5.50 to 6.00
Nos. 17 to 21	5.65 to 6.15
Nos. 22 and 24	5.80 to 6.80
Nos. 25 and 26	5.95 to 6.45
No. 27	6.00 to 6.50
No. 28	6.25 to 6.75
No. 29	6.40 to 6.90
No. 30	6.55 to 7.05

Tin Mill Black Plate

Nos. 15 and 16	4.05 to 4.20
Nos. 17 to 21	4.10 to 4.25
Nos. 22 to 24	4.15 to 4.30
Nos. 25 to 27	4.20 to 4.35
No. 28	4.25 to 4.40
No. 29	4.30 to 4.45
No. 30	4.30 to 4.45
Nos. 30 1/2 and 31	4.35 to 4.50

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Tin,	Lead		Spelter		
Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis	
Jan. 10.....	27.25	27.25	42.62½	7.35	7.25	9.25	9.00
11.....	27.00	27.00	42.87½	7.45	7.25	9.25	9.00
12.....	28.00	28.00	43.00	7.50	7.32½	9.25	9.00
13.....	28.25	28.25	.....	7.50	7.32½	9.50	9.25
14.....	28.75	28.75	44.00	7.50	7.50	9.75	9.50
15.....	29.00	29.00	44.25	7.65	7.50	10.00	9.75

NEW YORK, Jan. 17, 1917.

The tone of all the metals became stronger following the Allies' reply to Germany's peace note. After a sharp decline copper advanced just as sharply. Tin is higher, though business has not been heavy. Prompt lead is scarce and stronger. Spelter quotations are on the rebound. Antimony is dull, but firm.

New York

Copper.—The market sagged until Jan. 12, when the reply of the Entente Allies to Germany's peace note became known, on which news the market went up 1c. in one move. On Jan. 10, copper was exceedingly weak, and a large quantity of March, April and May electrolytic was offered at a substantial concession from 26.50c., but consumers were not interested. When the change came, they were anxious to place business at the price previously made, but the sellers had changed their views also, and no business resulted. Instead of less than 26.50c., holders asked 27c. to 27.25c. Yesterday the market was up to 29c. for both Lake and electrolytic, although a special lot of the former was taken at 29.50c. On the first two days of this week the market was a puzzle, some interests refusing to make bids, while no one seemed anxious to sell, and prices, at best, were but nominal. On Jan. 10 it was reported that some extremely large foreign business was under negotiation, but traders, while admitting that there might be some truth in the rumor, were inclined to believe that it emanated from Wall Street and had little behind it. Second quarter electrolytic was to be had yesterday at 27.50c. to 28c. Not much metal is available for either the first or second half. Since the turn upward, second hands have practically withdrawn from the market and selling short has ceased. The exports this month, including yesterday, totaled 11,591 tons. No quotations were cabled from London yesterday, but the previous quotation for spot electrolytic was £141.

Tin.—At no time has business been exceptionally active, but prices have advanced, the quotation for spot Straits yesterday being 44.25c. On Jan. 10, a dull day, Banca for January and February shipment from the Far East was sold at 40.25c. On Jan. 12, when the entire market took on a better tone and there was a fair demand for spot and nearby, Banca sold at 42c. to 42.50c. Probably 150 to 200 tons of Banca and Straits changed hands, nearly all of it being for near delivery. On Monday inquiry was large, especially for tin to arrive in four to six weeks, with the dealers interested as buyers. If enough metal had been available, probably 400 to 500 tons could have been taken. The quantity arrived is placed at 2225 tons, and there is afloat 3708 tons.

Lead.—Late last week, prior to the Allies' statement which appeared to make more remote the prospect of peace, lead was extremely dull, and in some directions weak. According to report, it was offered down to 7.25c., New York. By Monday the market had undergone a complete change, and 7.60c., New York, was bid for spot lead. Railroad transportation troubles have caused a shortage with some consumers, consequently they came into the market for spot metal, but not much else was doing. Yesterday, with the outside market at 7.65c., New York, and 7.50c., St. Louis, dullness prevailed. The sellers are not anxious to sell, inasmuch as they expect a higher market, while the consumers are wary of what they do, in view of recent breaks in price.

The exports this month, including yesterday, total only 330 tons. No prices were cabled from London yesterday.

Spelter.—The trade is at a loss to explain the action of a metal selling house in selling 540 tons of prime Western at concessions on the floor of the New York Metal Exchange early last week. The action came simultaneously with a break at London, and when the peace talk was at its height. Last Friday and Saturday and on Monday of this week a fairly good business was done at advancing prices. Yesterday activity tapered off, but quotations were firmer. Quotations for prompt prime Western were around 10c., New York, and 9.75c., St. Louis. February was about 9.62½c., St. Louis, and March about 9.37½c. Second quarter is about 9c., St. Louis. The exports this month, including yesterday, total 3133 tons. No cables were received yesterday.

Antimony.—The market is quiet but firm at 14.25c. to 14.50c., duty paid, for Chinese and Japanese grades.

Aluminum.—Offerings by second hands have brought ease to the market. A few hundred tons of No. 1 virgin aluminum, 98 to 99 per cent pure, is available at 57c. to 61c.

Old Metals.—The market continues quiet. Dealers' selling prices, which are unchanged, are as follows:

	Cents per lb.
Copper, heavy and crucible.....	28.50 to 29.50
Copper, heavy and wire.....	27.00 to 28.00
Copper, light and bottoms.....	24.00 to 25.00
Brass, heavy.....	16.50 to 17.00
Brass, light.....	12.00 to 13.00
Heavy machine composition.....	23.00 to 23.50
No. 1 yellow rod brass turnings.....	17.50 to 18.50
No. 1 red brass or composition turnings.....	17.00 to 19.00
Lead, heavy.....	6.75
Lead, tea.....	6.25
Zinc.....	7.00 to 8.00

Chicago

JAN. 15.—A sharp recovery in the prices of the leading metals at the close of the week brought quotations back almost to the level of the preceding week after a decline of from 2c. to 3c. per lb. We quote: Casting copper, 28c.; Lake copper, 29c.; tin, carloads, 44.50c., and small lots 46.50c.; lead, 7.50c.; spelter, 9.75c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 16.50c. to 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 21c.; copper bottoms, 19c.; copper clips, 20c.; red brass, 19c.; yellow brass, 14c.; lead pipe, 5.50c.; zinc, 5.50c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 35c.

St. Louis

JAN. 15.—Non-ferrous metals have not been active the past week. The close to-day on carload lots of lead was 7.50c. and on spelter 9.50c. to 9.75c. In less than carloads the figures are: Lead, 7.60c.; spelter, 12.50c.; tin, 47c.; Lake Copper, 31c.; electrolytic copper, 30.50c.; Asiatic antimony, 17c. In the Joplin mining district zinc blende has slumped about \$5 per ton, the basis range for 60 per cent being \$60 to \$75. Calamine was lower, at \$40 to \$45. Lead ore was also weaker at \$87.50, against \$90 a week ago. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9.50c.; heavy yellow brass, 12c.; heavy red brass and light copper, 18c.; heavy copper and copper wire, 19c.; pewter, 25c.; tinfoil, 32c.; zinc, 5.50c.; lead, 5.50c.; tea lead, 4c.

At a meeting of stockholders of the Carbon Steel Company, Pittsburgh, Jan. 15, at which about 67 per cent of the stock was represented, the plan was submitted by the board of directors for a rechartering of the company under the laws of Pennsylvania. It was decided to issue a circular to all stockholders asking their opinion of the plan. If 95 per cent of them approve the proposition, it will be put into effect; otherwise, the present charter and methods of paying dividends will be continued. The replies received to this circular will be considered at another meeting of stockholders in Pittsburgh, Jan. 29.

Collecting Munitions Manufacturers' Tax

The Base Is Net Profits and the Amount
12½ Per Cent—Makers of Parts Pay and
There Are Deductions on Final Product

The Federal Government has begun the collection of the munition tax, as provided by the law which went into effect Sept. 7, 1916. The act levies 12½ per cent. on the net profits derived from the manufacture of certain products. It differs very materially from the original bill, concerning which there was a great deal of discussion, in that copper and its alloys are exempted. Net profits are made the basis instead of gross receipts; there is no sliding scale in the percentage of tax, reckoned on volume of business transacted; there are no exceptions when income does not reach a given amount; and the tax applies to manufacturers of parts of munitions as well as to manufacturers of the completed product. The scope of taxable products is defined in Section 301 of the statute as follows:

Sec. 301. (1) That every person manufacturing (a) gunpowder and other explosives, excepting blasting powder and dynamite used for industrial purposes; (b) cartridges, loaded and unloaded, caps or primers, exclusive of those used for industrial purposes; (c) projectiles, shells, or torpedoes of any kind, including shrapnel, loaded or unloaded, or fuses, or complete rounds of ammunition; (d) firearms of any kind and appendages, including small arms, cannon, machine guns, rifles and bayonets; (e) electric motor boats, submarine or submersible vessels or boats; or (f) any part of any of the articles mentioned in (b), (c), (d) or (e); shall pay for each taxable year, in addition to the income tax imposed by Title I, an excise tax of 12½ per centum upon the entire net profits actually received or accrued for said year from the sale or disposition of such articles manufactured within the United States.

The tax is not assessed on income derived under contracts performed previous to Jan. 1, 1916. Returns must be made by manufacturers who are subject to the tax on or before March 1, under heavy penalty, and payment of the tax bill must be made within 30 days of its receipt, under penalty of 5 per cent. interest.

Some Manufacturers Taken Unawares

The receipt of form blanks upon which to make returns to the Collector of Internal Revenue were a surprise to many manufacturers, who had but a hazy idea, or no knowledge at all, of the status of the munition tax provision and of its attendant large expense. In some cases the profits for 1916 had already been distributed in the form of dividends or spent on improvements and otherwise. The law is retroactive, to include the whole of the year 1916. In some instances the tax will be paid under protest. A typical case of this sort is that of manufacturers of firearms not used for purposes of war, including sporting rifles, shotguns and certain types of pistols. A hearing has been held in Washington in regard to these products, their manufacturers maintaining that they should be exempted. No decision has been handed down. Also, builders of electric pleasure boats object to the ruling of the Government that "electric motor boats are those boats, regardless of size and character of construction, which are propelled by electric power."

An exceedingly important ruling is that "Appendages as used in paragraph (d) will include those adjuncts or accessories appended to firearms, not a part of them, but which facilitate their use, such as straps, belts, scabbards, shields, holsters, or other appurtenances common to such firearms." This opens up a field for taxation which is by no means small.

Very important is the inclusion as taxable product of "any part of any of the articles mentioned." This class is defined in a ruling as "any article relatively complete within itself and designed or manufactured for the special purpose of being used as a component part of a completed munition, and which, by reason of some peculiar characteristic, loses its identity as a commercial commodity, and which, without further treatment, cannot be used for any purpose other than that

for which it was designed." This ruling goes on to state that a stock or commercial commodity purchasable in the general trade or open market, if adapted to use in the manufacture of a munition, is not a "part" within the meaning of the law, excepting when "manufactured specially for and sold to a manufacturer to be by him incorporated in and made an essential part of any munitions."

Factors in the Government Return

The return to the Government includes the following facts:

Total amount of capital employed in the business or properties and used in the manufacture of munitions or parts thereof.

Total amount of debts or loans (interest-bearing) contracted to meet the needs of such business.

Gross amount of income received or accrued from the sale or disposition of munitions or parts thereof manufactured in the United States.

Deductions:

Cost of raw materials entering into the manufacture of such articles or parts.

Total amount of expenses of operation and maintenance relating to the business or properties.

Amount of interest paid within the year on debts or loans described in Item 2.

Taxes of all kinds paid within the year with respect to the business or properties relating to the manufacture of munitions or parts thereof.

Losses actually sustained and charged off within the year in connection with the business, and not compensated for by insurance or otherwise.

Depreciation on property used in, but not specially constructed or installed in, this business.

Amount apportioned to the year for amortization of the cost of buildings and machinery specially constructed or installed for use in manufacture of munitions or parts thereof.

Total deductions, items 4 to 10, inclusive.

Total net profits upon which tax at 12½ per cent is computed.

Total amount of tax to be assessed.

The total of the seven items under "Deductions" is subtracted from the gross income to find the amount upon which the 12½ per cent. shall be reckoned. The item of raw material includes not only crude products and elemental substances, but all essential finished or unfinished parts as well. That is to say, such articles as figure into the business of manufacturers of parts, upon which they pay the tax, become raw materials for the manufacturers of complete munitions. Naturally, the greater the total of expense of manufacture, the less the income and therefore the less the tax.

Depreciation Charges

A sharp distinction is made between depreciation and amortization, which distinction is in favor of the manufacturer. The deduction authorized for depreciation is for loss due to wear and tear of physical property which is not specially designed or installed for the purpose of manufacturing munitions and their parts, but which without material alteration or change may be used in connection with other business. The annual deduction on this account shall be a reasonable allowance determined on the basis of the cost and the probable number of years determining the life of the property.

Amortization goes much further than that, and provides for the rapid charging off of the cost of buildings and machinery which are not intended for permanent use. When these "are constructed or installed for use in the manufacture of munitions or parts, and which, when no longer useful for this purpose, cannot without material alteration and change, if at all, be used for any other purpose, then the annual allowance to be deducted on this account will be determined by esti-

inating the probable number of years the property will be used in the manufacture of munitions or parts, and by dividing the cost of such property, less estimated salvage, by such number of years."

In cases where other business is carried on in connection with the manufacture of munitions, and the munition costs cannot be segregated, the expenses deductible for the purpose of the act shall be such a portion of the entire expense, as the gross income received from the manufacture of munitions is a portion of the entire gross income.

Customs Decision

Rule of Chief Use in Fixing Duties

The application of the rule of chief use in construing the provisions of the tariff formed the basis for a recent decision of the United States Court of Customs Appeals in the protest case of Brown & Co., New York, dealing with the classification of apparatus used to some extent in the production of refined sugar. Two centrifugal machines and a pump and tank were imported for use in the manufacture of sugar, and at the time of the court's decision were actually so being used in the Arbuckle Sugar Refinery, Brooklyn, N. Y.

The appraiser of the port of New York reported to the Board of General Appraisers that, as about 90 per cent of machines of the kind under protest were used for purposes other than sugar-making, such as in dye-works, in certain chemical processes, as laundry extractors, cream separators, etc., the merchandise had been taxed 20 per cent under paragraph 167 of the tariff, as "manufactures of metal, not specially provided for." The importers, in their appeal to the general board, claimed that the apparatus was properly free of duty under that part of paragraph 391 specifying "machinery for use in the manufacture of sugar." The board overruled the protest and held that the goods were dutiable as assessed. The question then came before the court for settlement.

Presiding Judge Montgomery, in his decision for the court, said it would be seen that the sole question standing for decision was whether a machine, the chief use of which was other than in the manufacture of sugar but which was imported for such lesser use, fell within the terms "machinery for use in the manufacture of sugar" appearing in paragraph 391. He referred to the fact that the Supreme Court had construed terms very like those here involved in a number of cases, the effect of which was to make the dutiability of goods turn upon the question of chief use. The Customs Court, accordingly, in denying the contention of Brown & Co., said the court believed the case was one for the application of the rule of chief use, the board being affirmed.

Smelter Smoke and Fume Symposium

A symposium on the smelter smoke and fume problem has been arranged by the New York sections of the American Institute of Mining Engineers and the American Electrochemical Society. Ligon Johnson, consulting attorney for the International Nickel Company and the American Smelting & Refining Company, will discuss "The History and Legal Phases of the Smoke Problem;" W. W. Strong, Scientific Instrument & Electrical Machine Company, "The Theoretical Aspects of Electrical Precipitation;" Linn Bradley, Research Corporation, "The Cottrell Process in Practice." A number of others who have had much experience with the interesting problem have been asked to join in the discussion. The meeting will be held at the Machinery Club, 50 Church Street, New York City, on Friday, Jan. 26, at 8 p. m., and will be preceded by an informal dinner at 6.30 at \$1.75 per cover.

The German Steel Trade

At the close of the regular meeting of the German Steel Works Union on Dec. 7, 1916, the following statement on the condition of the German steel trade was issued: "In semi-finished steel demand has so increased

that the most strenuous exertions are necessary to meet the urgent domestic requirements. Prices for the ensuing quarter are not changed. All contracts for neutral countries have been declined in the interest of domestic business. In railroad material the State Railways have placed their orders for heavy permanent way material for the next few months, the only requirements considered being those for war purposes. In shapes demand for army purposes is increasing, sales for the current quarter having been suspended. Orders from neutrals have been in most cases refused."

Iron and Industrial Stocks

NEW YORK, Jan. 17, 1917.

Conditions on the Stock Exchanges recently have not been conducive to wide fluctuations. Interest in stock speculation has largely subsided, only a few securities showing any considerable volume of daily transactions. Apparently, some influence of great importance is the only thing which will bring about renewed activity. A marked exception to the sluggishness of most stocks was the heavy decline in Canadian Car & Foundry, following the destruction of its munitions factory in New Jersey. The range of prices on active iron and industrial stocks, from Wednesday of last week to Tuesday of this week, was as follows:

Allis-Chal., com.. 26 1/4 - 29	Gulf States Steel, 1st pref. 105 1/4
Allis-Chal., pref.. 83 1/4 - 85	Harb.-Walk. Refrac., com. 124
Am. Can., com... 44 - 47 1/4	Int. Har. of N. J., com. 119 1/4 - 120 1/4
Am. Can., pref. 109	Int. Har. Corp., com. 84 - 88
Am. Car & Fdy., com. 63 1/4 - 68	La Belle Iron, com. 80 - 80 1/4
Am. Car & Fdy., pref. 118	La Belle Iron, pref. 125 - 125 1/4
Am. Loco., com.. 74 1/4 - 78	Lacka. Steel, 81 1/4 - 86
Am. Loco., pref.. 106 - 106 1/4	Lake Sup. Corp., 18 1/2 - 20 1/2
Am. Rad., com. 410	Midvale Steel, 60 - 63
Am. Ship, com... 64 - 65 1/4	Nat. En. & Stm., com. 25 1/4 - 27 1/4
Am. Ship, pref.. 93 - 95	N. Y. Air Brake, 144 - 145
Am. Steel Fdries, 60 - 62 1/4	Nova Scotia Stl., 112 - 116 1/4
Bald. Loco., com, 54 - 58	Pitta. Steel, pref. 101 - 102
Bald. Loco., pref. 102 - 102 1/4	Pressed Stl., com. 72 1/4 - 78 1/4
Beth. Steel, com. 470 - 490	Pressed Stl., pref. 103 - 105
Can. Car & Fdy., com. 25 - 31	Ry. Steel Spring, com. 49 - 51 1/4
Can. Car & Fdy., pref. 62 - 70	Ry. Steel Spring, pref. 100 - 101
Carbon Stl., com. 88 - 95	Republic, com... 75 1/4 - 80 1/4
Carbon Steel, 2d pref. 75	Republic, pref... 104 - 104 1/4
Central Fdry., com.... 23	Sloss, com. 67 - 70 1/4
Central Fdry., pref. 39 - 41	Un. Alloy Steel, 47 - 49 1/4
Chic. Pneu. Tool. 70 - 74	U. S. Pipe, com.. 20 1/4 - 21 1/4
Colo. Fuel, 44 - 46 1/4	U. S. Steel, com. 109 1/4 - 115
Cruc. Steel, com. 59 1/4 - 65 1/4	U. S. Steel, pref. 119 1/4 - 120 1/4
Cruc. Steel, pref. 114 1/4 - 116	Warwick, 9 1/4
Driggs-Seabury, 49 - 53	Westing. Elec... 52 1/4 - 53 1/4
Gen. Electr'c... 167 1/4 - 170 1/4	
Gt. No. Ore Cert. 34 1/4 - 36 1/4	
Gulf States Steel, 121 - 133	

Dividends

The Crocker-Wheeler Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable Jan. 15, and 2 per cent on the common stock, also payable Jan. 15. The common stock is now on an 8 per cent basis.

The Ontario Steel Company, Ltd., regular quarterly, 1 1/4 per cent on the preferred stock, payable Feb. 15.

The General Ordnance Company, Derby, Conn., \$8 per share, payable Jan. 20.

The Anglo-American Mill Company, Owensboro, Ky., manufacturing flouring mills, semi-annual, 10 per cent in cash and 20 per cent in stock.

The Trussed Concrete Steel Company, 4 per cent on the common stock. The company has no regular dividend policy.

The Crucible Steel Company of America, 2 per cent on the preferred stock payable in February. This leaves 14 1/4 per cent deferred dividends due.

Stockholders of the Central Foundry Company at a special meeting, Jan. 8, authorized the creation of \$600,000 of new first preferred 8 per cent cumulative stock. Of the new stock \$574,000 will be issued to stockholders at par with accrued dividends from Jan. 1, 1917, on the basis of 7 shares of new stock for each 100 shares of common or preferred now owned. Stockholders of record Jan. 19 will have the right to subscribe, with payment to be made on or before Feb. 3. Money accruing from the sale of the new stock will be used to pay off \$525,000 notes maturing April 15 next and bank loans of about \$50,000.

PERSONAL

John O. Pew Retires

John O. Pew, for over four years president and general manager of the Youngstown Iron & Steel Company, Youngstown, Ohio, has resigned. He was first elected to that position on the death of L. E. Cochran, who had been president several years. Mr. Pew has for some time had this step in mind, but desired to continue with the company in an executive capacity until the large additions under way, notably the open-hearth steel plant and extensive improvements to the finishing mills, were completed. These have been about finished and he feels that he can retire from active participation in the management. It is reported, but not officially confirmed, that Fred H. Schmidt of New York City will be elected by the directors to succeed Mr. Pew, who will continue as a director of the company.

The Youngstown Iron & Steel Company was organized in 1894 under the name of the Youngstown Iron & Steel Roofing Company. The business expanded rapidly under the efficient management of Mr. Pew and his associates, and has become one of the largest sheet establishments in the country, about a year ago completing an open-hearth steel plant to supply its own sheet bars and now adding another 75-ton furnace. H. W. Heedy is first vice-president; C. A. Cochran, second vice-president and secretary; Mason Evans, treasurer, and Charles B. Cushwa, general superintendent.

W. E. Leake, who has been vice-president of the Alabama Company, Birmingham, Ala., since its organization, and was in charge of mines and general physical operations, has resigned to attend to other interests. It is not known if the position will be filled. Harry W. Coffin, the other vice-president, is the Birmingham head of the company, with E. N. Rich, Baltimore, chairman of the board.

H. M. S. Tuckwell, chief engineer of the London office of the Tata Iron & Steel Company, India, arrived in New York on Jan. 16 for a few weeks' stay in this country.

William Wieman, secretary and treasurer of Banning, Cooper & Co., Ltd., iron and steel factor, Oliver Building, Pittsburgh, has resigned and has been succeeded to both positions by George L. Claypool, who has been connected with the house for some years.

Dr. Harry C. Evans, for some years chief surgeon of the Carnegie Steel Company in the Youngstown district, has departed for France, where he will join the American ambulance corps for active work on the battlefields and in the hospitals. Prior to leaving for his new post of duty, he was given a dinner in the Elks Club, Youngstown.

A. L. Andrews, president Andrews Steel Company and Newport Rolling Mill Company, Newport, Ky., and Frank A. Moeschl, general manager of sales of these companies, are spending a month at Mr. Andrews's winter home at Sewell's Point, Fla.

L. O. Koven, L. O. Koven & Brother, Jersey City, N. J., who was president of the Eastern Supply Association for three years, retiring last October, has had his services in behalf of that organization substantially recognized. He was given not only an enthusiastic resolution of thanks but was presented at his home on the evening of Dec. 21 a sterling silver set composed of six individual plates and a tray, suitably inscribed, and representing the most artistic handicraft of the Gorham Company. P. M. Beecher made the address of presentation, to which Mr. Koven responded suitably.

Ophuls, Hill & McCreery have been incorporated as consulting engineers, with offices at 112-114 West Forty-second Street, New York. The firm comprises Fred Ophuls, who has specialized in ice and refrigerating in association with J. Harold McCreery. Albert P. Hill will devote his attention to the mechanical and

electrical department. The firm will specialize on ice and refrigeration producers, gas and oil application, and electrical and mechanical installation. It will maintain a department for appraisal and analysis of existing plants.

J. P. Morgan & Co., New York, announce that Waldo H. Marshall, who recently resigned as president of the American Locomotive Company, will become identified with their export department.

George S. Gates, who for a number of years has been connected with the iron and steel trade in Philadelphia and New York, has associated himself with the Charles Dreifus Company, at its Philadelphia offices in suite 1312 Widener Building.

C. G. Tarkington has resigned his connection with the Snyder Electric Furnace Company, Chicago, and is now in charge of a branch office of the Haynes-Stellite Company, Kokomo, Ind., recently opened in room 2418 Farmers Bank Building, Pittsburgh.

At the annual election of the Ferguson Steel & Iron Company, Buffalo, N. Y., Jan. 12, James E. Ferguson was re-elected president; Charles Kennedy was re-elected vice-president; Charles W. Hyne, general manager of the company, was elected secretary, and John W. Robinson, former president of the Third National Bank, was elected treasurer. John W. Cowper, of the John W. Cowper Company, was elected a director. Mr. Ferguson, the president of the company, who was recently elected a director of the Buffalo Chamber of Commerce, started Jan. 14 for a few months' stay in the South.

Charles Herman, who has been assistant superintendent of the foundry department of Fairbanks, Morse & Co., Beloit, Wis., since Jan. 1, 1912, has resigned to become manager of the foundry of the Hooven-Owens-Rentschler Company, Hamilton, Ohio.

Prof. Theodore Bache-Weug, Christiana, Norway, is spending several weeks in Wisconsin to personally place orders with manufacturers of paper and pulp mill equipment, communication by mail being impossible.

Ira N. Hollis, president American Society of Mechanical Engineers, and head of the Worcester Polytechnic Institute, was the principal speaker at the monthly banquet and meeting of the Milwaukee branch of the society on Saturday evening, Jan. 6.

The Chicago district territory of the Adams-Bagnall Electric Company, Cleveland, Ohio, has again been placed in charge of Van N. Marker, with headquarters in Machinery Hall, 549 West Washington Boulevard, Chicago. He was associated with the company's Chicago district office for approximately seven years, up to March, 1916.

James W. Barr has been employed as general machine-tool salesman by the Vandyck Churchill Company, New York City. He was formerly Eastern representative of the Cincinnati Milling Machine Company.

George W. Knopf has established himself in the consulting engineering business, to specialize in the design and construction of industrial plants, with offices in the Pennsylvania Building, Philadelphia.

Edward M. Hallett has resigned as secretary of the Bell Locomotive Works, 30 Church Street, New York, but will continue as treasurer of the company. Stanley McCormack, manager of sales, succeeds Mr. Hallett as secretary.

Martin McDermott, sales manager of the Pittsburgh-Buffalo Company and the Four States Coal & Coke Company, has resigned to become Western sales manager for the Amherst Coal Company, Huntington, W. Va. He will have his office in Cincinnati, Ohio. Before leaving Pittsburgh he was tendered a farewell dinner by his friends and business associates, and was presented with an art bronze statue.

P. C. Pickrel has joined the sales force of the Vanadium Alloys Steel Company under C. M. Bigger, general manager of sales, at Cincinnati, Ohio.

Charles T. Bird, connected with the Pangborn Corporation, Hagerstown, Md., some years ago, as sales engineer, and for the past year with the Mott Sand-

Blast Company, resigned from the latter connection Jan. 1, to become associated again with the Pangborn Corporation as vice-president and works manager, in charge of engineering and production.

H. H. Pleasance has been appointed assistant general manager of sales of the United Alloy Steel Corporation, Canton, Ohio. His headquarters will be in Canton and Cleveland.

Recent visitors to the north Pacific coast cities were John J. Donohue, of Fullerton & Sons, shipbuilders, Paisley, Scotland, and K. Fukushima, representing the Osaka Iron Works, Osaka, Japan.

H. D. Gumpfer, until recently connected with the Emerson Company, efficiency engineer, is now associated with W. F. Hebard in the electric truck sales department of the Buda Company, Chicago. He is regarded as particularly well qualified to solve problems with special reference to the proper application of electric industrial trucks and tractors to attain highest operating efficiency.

Announcement is made of the appointment of Thomas H. McKenney as supervisor of labor and safety at South works, Illinois Steel Company, succeeding Arthur H. Young, resigned. John Weichert has been appointed assistant supervisor.

A. L. Mathews has been elected a vice-president of the J. G. White Management Corporation to take charge of a new department, which has been organized for the management of sugar properties.

Carl A. Wendell has severed his connection with the Joliet works of the Illinois Steel Company, to take the position of chief engineer of the American Ore Reclamation Company, 71 Broadway, New York. For the last two years Mr. Wendell has been steam engineer at Joliet, and previous to that was in charge of experimental engineering. He has conducted all the experiments for the United States Steel Corporation relative to the treatment of coal by washing and other means of concentration. He has had a wide experience in designing, constructing and operating at various steel works in this country.

Lewis H. Kittredge, president Peerless Motor Car Company, Cleveland, started this week on a trip of several weeks to Hawaii.

W. M. Emerick, of the traffic department of the Brier Hill Steel Company, has resigned to become traffic manager of the Wilkoff Brothers Company, iron and steel scrap, Youngstown, Ohio, the appointment taking effect Jan. 22.

At a meeting of the board of directors of the Crucible Steel Company of America, held in Pittsburgh Jan. 16, Herbert DuPuy was elected temporary president. He will continue to hold the office of chairman.

H. A. Shier, who for the past seven years has represented the Bethlehem Steel Company in southern Ohio, has resigned, to take effect Feb. 1, and will thenceforth represent the Onondaga Steel Company Inc., Syracuse, N. Y., in the southern Ohio and western Pennsylvania district.

Cincinnati Sheet Metal Contractors' Meeting

The Cincinnati Association of Sheet Metal Contractors, at its annual meeting Jan. 9, elected the following officers: President, Edward F. Anspach; vice-president, F. L. Gibson; secretary, John S. Hengler; treasurer, Charles Kobmann. Trustees, John Steigel, Ferdinand Doepke and A. Fahrle. Publicity chairman, C. L. Smith. A committee composed of John Weigel and C. L. Smith has been appointed to arrange for the annual dinner to be held in March at the Cincinnati Business Men's Club. F. William Stechow, who has served as president for two terms, presided at the meeting.

Norway's war losses of ships up to Nov. 30, 1916, was 242 vessels of 325,415 gross tons, of which 182 were steamers of 281,628 tons. The insurance value was \$39,045,000, but the actual market value very much higher. Ships that before the war could be purchased for about \$25 per ton now cost \$150 per ton or more.

New England Foundrymen Elect Officers

The annual meeting of the New England Foundrymen's Association, which also marked the twenty-first anniversary of the founding of the organization, held at the Exchange Club, Boston, Mass., Jan. 10, was the most largely attended gathering in its history. There were 200 present, and the evening was largely given over to entertainment. Charles L. Newcomb, Deane Steam Pump Works, Holyoke, Mass., was the toastmaster, and under his direction there was no lapse in the activities of the night. Charles A. Reed managed the festivities, and presented a vaudeville show that won many encores for the participants. At the meeting preceding the dinner, the following officers were chosen for the coming year: President, T. R. Scott, Brown & Sharpe Mfg. Company, Providence; vice-president, George P. Aborn, Blake & Knowles Steam Pump Works, East Cambridge, Mass.; treasurer, George H. Gibby, Gibby Foundry Company, East Boston; secretary, Fred F. Stockwell, Barbour-Stockwell Company, Cambridge. Executive Committee: Charles A. Reed, Reed, Fears & Miller, Boston; H. Paul Buckingham, Arcade Malleable Iron Company, Worcester; A. N. Abbe, American Hardware Corporation, New Britain, Conn.; A. B. Root, Hunt-Spiller Mfg. Corporation, Boston; Robert E. Newcomb, Deane Steam Pump Works, Holyoke.

American Iron and Steel Institute Membership

Following is a list of members elected to the waiting list of the American Iron and Steel Institute, to be transferred to its associate list as vacancies occur:

Carl L. O. Gaul, assistant superintendent By-Products Coke Corporation, 11,200 Torrence Avenue, Chicago.

James L. Record, president Minneapolis Steel & Machinery Company, Minneapolis, Minn.

George M. Gillette, vice-president Minneapolis Steel & Machinery Company, Minneapolis, Minn.

B. L. Sommer, secretary and treasurer Keystone Steel & Wire Company, Peoria, Ill.

Christian Girl, president Perfection Spring Company, Cleveland.

William H. Bailey, engineer Illinois Steel Company, Chicago.

Fred W. Beach, general manager La Salle Steel Company, 2395 South Halsted Street, Chicago.

D. W. Kerr, vice-president Trumbull Steel Company, Warren, Ohio.

A. N. Flora, general manager of sales Trumbull Steel Company.

William M. McFate, secretary Trumbull Steel Company.

Fred Wille, chief engineer Trumbull Steel Company.

Leonard A. Funkhousen, assistant electrical engineer Steel Company of Canada, Hamilton, Canada.

J. P. Hilands, sales manager Ohio Seamless Tube Company, Shelby, Ohio.

Carnegie Officials' Twentieth Dinner

The twentieth annual dinner of officials and operating heads of the Carnegie Steel Company was held in the William Penn Hotel, Pittsburgh, Jan. 6. Among the guests present were James A. Farrell, president United States Steel Corporation, and A. C. Dinkey, former president Carnegie Steel Company. Homer D. Williams, who succeeded Mr. Dinkey as president of the Carnegie Company, was toastmaster. John McLeod, assistant to the president, responded to the toast, "Sociology of Service." Ambrose N. Diehl, assistant general superintendent at the Duquesne works, spoke on "Service of Production," and John W. Dix, assistant general manager of sales, discussed "Service in Commercialism." Col. H. P. Bope, vice-president and general manager of sales, responded to the toast, "Service; Its Aim and End." About 100 attended the dinner.

Converting flue dust, containing about 25 to 30 per cent manganese, into specular iron is being accomplished by the Société des Acieries de Paris et d'Outreau, which has installed a 500-kw. electric furnace for dealing with it. The dust comes from some Cowper stoves working in conjunction with ferromanganese blast furnaces. It is dealt with in the form of briquettes.

OBITUARY

Charles C. Ramsey

Charles Cyrus Ramsey, president Crucible Steel Company of America, died at the age of 55 years, Jan. 11, in the Allegheny General Hospital, Pittsburgh, Pa., following an attack of pneumonia, contracted five weeks before. He was born in Allegheny City, Pa., and started his business career as stenographer for Charles



CHARLES C. RAMSEY

L. Cole, assistant general freight agent of the Pennsylvania Company. When 23 years old, he changed his employment and became a stenographer in the office of Park Brother & Co., then the largest manufacturers of crucible steel in this country.

Mr. Ramsey gradually rose from one position to another until he became manager of Park Brother & Co.'s Philadelphia branch. He shortly demonstrated such commercial ability that he was chosen by the firm to go to New York to manage its branch there, with the entire Eastern district under his charge. He held this position until 1900, when the Park Steel Company, successor to Park Brother & Co., was absorbed by the present Crucible Steel Company of America.

Serving for a time with R. E. Jennings in the management of the Eastern business of the company, Mr. Ramsey, on Mr. Jennings's retirement, was made fourth vice-president and sole manager of the Eastern office. In the winter of 1910 the death of Frank B. Smith, then president of the company, caused a vacancy. Mr. Ramsey was called to Pittsburgh as assistant to the president, which latter office was then temporarily held by Herbert DuPuy. In July, 1910, Mr. Ramsey was unanimously elected president of the Crucible Steel Company, and, soon thereafter, of its affiliated companies, and these positions he held to the end of his life.

Long before his death Mr. Ramsey had gained recognition throughout the country as an expert in the crucible steel business. His rise was phenomenal, being accomplished through hard work, coupled with natural ability. To offset the strain of too close application to his work he long had recourse to athletics, excelling in many branches of sport and being known as a skillful golf player. In late years, however, he felt that the company could not spare him the time for such indulgence and therefore confined himself too closely to his desk. He was of a genial disposition, was a member and warden of the Protestant Episcopal

Church, a man of highly cultivated tastes and of a social disposition, as shown by his connection with the Duquesne, Allegheny Country and Edgeworth clubs, of Pittsburgh, the New York Athletic Club, India House and Engineers' Club, of New York, and the Pennsylvania Society. He leaves his widow, two daughters and a son.

WILLIAM ROOT, whose death at Wilmington, Del., was announced briefly last week, was born in Pottstown, Pa. At an early age he entered the employ of the Ellis & Lessig Iron Company, and next the Glasgow Iron Company, known as the Valley Mill in Pottstown. A few years later he became connected with the then Chester Rolling Mills at Thurlow, Pa., which had just installed an open-hearth steel plant. He remained with that company up until and after it merged into the Wellman Iron & Steel Company. In 1893 he returned to Pottstown and remained until 1898, when he entered the employ of the Taylor Iron & Steel Company at High Bridge, N. J., where he was engaged until 1910, when he became connected with the Edgar Allen American Manganese Steel Company, later the American Manganese Steel Company of Chicago, Ill., and New Castle, Del., being superintendent of the latter plant at the time of his death. He had contributed much in a practical way toward solving the difficult problems in alloy steel castings, chief among which was the manufacture of manganese steel castings, so largely in demand to-day.

HENRY GORDON STOTT, superintendent of motive power Interborough Rapid Transit Company, New York, and since 1904 in charge of the power departments of the subway, elevated and surface lines, died Jan. 15 at his home in New Rochelle, aged 52 years. He was born in the Orkney Islands, Scotland, and was graduated in 1885 from the College of Arts and Sciences in Edinburgh. He came to this country in 1891 and installed an underground conduit and cable system for the Buffalo Light & Power Company. In 1904 he constructed the Fifty-ninth Street power plant, New York. He was president of the American Institute of Electrical Engineers in 1907-08, and belonged to the American Society of Mechanical Engineers, the American Society of Civil Engineers, the New York Electrical Society, the Engineers' Club, and the Wykagyl Country Club. He leaves a widow, a son and a daughter.

ELLIS J. HANNUM, secretary Newton Machine Tool Works, Inc., Philadelphia, Pa., died Jan. 7, after being confined indoors only one week. He had not enjoyed good health for a number of years, and for this reason relinquished his duties in the engineering department of the company, and lately acted in an advisory capacity to the advertising department. He has been with the company 29 years, entering its employ as a boy. He early showed a natural aptitude for free hand sketching and drawing, and progressed rapidly in the drafting and engineering departments under the tutelage of Charles C. Newton.

FRANK L. STRONG, president Frank L. Strong Machinery Company, Manila, P. I., died Jan. 13 at the Hotel Seville, New York, aged 72 years. He is credited with being the man most responsible for the introduction of modern machinery in the Philippines, where he lived many years. He leaves his widow and a daughter, both of whom are in Brookline, Mass., the former residence of Mr. Strong.

JOSEPH T. DUGDALE, for many years superintendent of the Bridge & Beach Mfg. Company, stove manufacturer, St. Louis, died in National City, Cal., Jan. 10.

Sulphuric acid production in the United States in 1916 is estimated at 4,475,000 tons, expressed in terms of 50 deg. acid, an excess of 600,000 tons over the 1915 output. A notable feature was the great increase in the production of acids greater in strength than 66 deg., the estimate putting these at over 1,000,000 tons, as compared with less than 200,000 tons in 1915.

Wage Advances, Bonuses and Strikes

At the bi-monthly examination of sales sheets of bar iron made by mills in the Western Bar Iron Association, held in Youngstown, Ohio, last week, it was found that the average price on shipments of bar iron in November and December was 2.15c. This entitles the puddlers to a rate of \$10.30 per ton for January and February, an advance of 75c. over the November and December rate, which was \$9.55 per ton. Muck rollers get one-eighth the straight price of puddling and receive an advance of about 9c. per ton, while finishers get 2 to 3 per cent advance. Sheet mill hands will receive an advance of 1½ per cent for January and February over the November and December rate, and tinplate hands will receive an advance of 3 per cent for January and February over the November and December rate. The new rate of \$10.30 for puddling is very much the highest rate ever made.

The shop employees of the Cutler-Hammer Mfg. Company, Milwaukee, all received a Christmas present in cash on Dec. 23 and before Jan. 1 a notice was posted of a bonus of 10 per cent of the yearly wages or salary. This goes to all the 2400 employees of this company.

A notice signed by A. Wood, works manager of the Niles Tool Works Company, Hamilton, Ohio, recently posted in the shop, reads as follows: "For the purpose of encouraging our employees to lose as little time as possible, the company has decided to pay a bonus for regularity. Beginning Jan. 2 and continuing for a period of 28 weeks, ending July 14, the company will pay every four weeks (that is, on every second pay day) a bonus to each employee who shall have put in 95 per cent or more of straight time during the four weeks' period. Holidays on which the plant is shut down, that may come in any four weeks' period, will not be counted as lost time in determining bonus. Loss of straight time due to sickness, promptly reported to your foreman, may not be regarded as lost time, but each case will be considered separately. The bonus to be paid to each workman entitled to receive it will be 10 per cent of his total wages for the four weeks' period, including overtime (but not including piece work profits) and it will be paid on every second pay-day in the same manner as wages are paid. The foregoing applies to all employees who are paid by the hour."

The J. N. Lapointe Company, manufacturer of broaching machines and broaches, New London, Conn., has posted this notice in the several departments of its factory: "In order to encourage our employees to exert their best efforts in our behalf, we hereby announce an increase of wages of 10 per cent to take effect immediately. We hope that the above will induce every employee to do his best for the company." In addition to this increase, the employees receive a monthly bonus based on the output of the company, amounting to about 10 per cent of the wages earned.

The Aylward Sons Company, Neenah, Wis., iron and steel foundry, has announced to employees that a bonus of \$5 per month will be paid during 1917 on all wages.

The American Brass Company, Waterbury, Conn., which paid all employees at its plant in Kenosha, Wis., and other cities, a bonus of 10 per cent on 1916 wages, has notified all employees at Kenosha, numbering 2700, that salaried people will be paid 10 per cent additional during 1917, and others will receive a straight advance of 2½c. per hr.

The Doehler Die Castings Company, Toledo, Ohio, has adopted a bonus system under the terms of which employees who have been with the company three years or more will be paid at the end of each quarter 10 per cent of their earnings during that quarter. Employees of two years' standing will get two-thirds of 10 per cent and those with the company one year will get one-third of 10 per cent.

The Bucyrus Steam Shovel Company, Evansville, Ind., has put in force a bonus system by which employees will receive 15 per cent additional to their wages every three months. The company is working on shells for the Allies.

The A. M. Byers Company, now operating the sev-

eral plants of the Susquehanna Iron Company at Columbia, Pa., has announced that all salaried employees will hereafter receive a bonus of 10 per cent each month.

The Sumner Iron Works, Everett, Wash., announced an increase of 12½ per cent in wages on Jan. 1. The company also plans to put another shift of men at work, allowing 17 hr. of operation daily.

At Portland, Ore., plans are being made for carrying on their respective fights by both employers and union leaders involved in the shipbuilding strike, which caused 1400 men to leave their work in two plants Dec. 29 and 30. Each side is emphatic in declaring there will be no compromise. The Northwestern Steel Company announces that it will continue to operate as an open shop and not otherwise. The men demand an 8-hr. day and a closed shop.

Foundry workmen in two plants at Stockton, Cal., struck Jan. 8, demanding union shop conditions. The employers at Stockton recently established an 8-hr. day voluntarily.

Machinists and molders of the Norton Iron Works, Ashland, Ky., have struck, demanding a 9-hr. day at \$3.50 per day.

The welding department in the plant of the Tyler Tube & Pipe Company at Washington, Pa., which was closed down for a week or more on account of the strike of the welders and their helpers, has started up again. The strike was caused by the removal of a bonus which was in effect to Jan. 1. The men have decided they were satisfied with the wages they were receiving and returned to work.

About 300 employees in the general offices of the Republic Iron & Steel Company at Youngstown, Ohio, have been granted an advance of 10 per cent in salaries, effective from Jan. 1. The company will shortly blow out its Hannah furnace, which will be relined and otherwise repaired. The contract for the work has been placed with the William B. Pollock Company, Youngstown.

A general voluntary increase in wages will be put into effect next week by the Burden Iron Company, Troy, N. Y., amounting to about 10 per cent.

Foundry Wages in New York and New Jersey

Only one wage dispute is now under discussion between the molders' union and the New York and New Jersey branch of the National Founders' Association. This is the demand of Elizabeth, N. J., molders for an increase from \$4 to \$4.25 per day as a minimum. On July 6, 1916, Elizabeth employers agreed to an advance of 25c., or to \$3.75, as a compromise, the union having demanded a 50c. increase. After six months the molders have renewed the demand.

Newark foundrymen paid \$3.75 per day until Nov. 15 when they granted a 25c. raise.

In Brooklyn, Manhattan and Jersey City, which constitute a district in the molders' union, an increase to \$4 was granted July 1 with the agreement that on Jan. 1, 1917, a further advance to \$4.25 would go into effect. This arrangement is now in effect.

Paterson molders asked for an increase from \$3.50 to \$4 last fall. The foundrymen offered \$3.75 beginning Jan. 1. This wage is now in force, but the union has threatened to demand the additional 25c. by spring.

The wage for foundry helpers ranges between \$2 and \$2.50. Although they are not members of unions, the laborers have formed temporary organizations for demanding higher wages. In Brooklyn in particular this pressure is being felt.

The principle of a new process for reducing flue dust and other metallic fines consists in emptying these materials into molten metal, mixing and then applying a blast of gas, generated in the furnace, to the surface of the mixture. The process is patented (U. S. 1,190,712) by Samuel L. Boggs, of Pittsburgh, Pa., and the apparatus and mode of operation are described in the patent papers.

VIRGINIA PIG-IRON RATES

Southern Roads Win on Divisions—Reductions on Alabama Iron

WASHINGTON, Jan. 16, 1917.—A controversy of long standing with regard to the divisions of joint rates on pig iron in carloads from Virginia furnaces to Baltimore, Philadelphia, New York, Boston and other points has been settled by the Interstate Commerce Commission in favor of the Southern roads.

Preceding reports in this case (Low Moor Iron Company of Virginia et al. vs. Chesapeake & Ohio Railway Company et al.) prescribed maximum all-rail rates upon pig iron in carloads from Virginia furnaces to points north and east. The Northern and Southern lines participating in these joint rates were unable, however, to agree as to the divisions and in consequence the Chesapeake & Ohio Railway Company and the Norfolk & Western Railway Company petitioned the commission to determine the divisions. The petitioners maintained that they should continue to be paid the same divisions which they received before the reduction in the rates, while the Northern lines contended that the reduced rates should be divided in the same proportions as the original rates were divided. The petitioners insisted that normally rates upon their lines and south of the so-called gateways should yield ton-mile earnings greater than those north, because of the more difficult operating conditions and lower density of traffic. Many of the Virginia furnaces are situated on branch lines where the density of traffic is much lower than upon the main line. The lines north of the gateway maintained that their divisions of the joint pig-iron rates should be materially higher than their local rates or rates from furnace points on their lines, mile for mile, and in support of this contention representatives of the Northern roads declared that the divisions asked for were less than were received on other pig iron and, further, that a great deal of the Southern pig iron coming into Northern territory displaced an equal quantity that would be made by Northern furnaces and that this consideration entered into the original agreement as to the rate division. The commission's finding follows:

We are of opinion and find that the joint rates on pig iron from the Virginia furnaces to the territory specified, prescribed in the previous reports in this case, should be divided upon the basis suggested by the petitioners, which will accord the lines south of the gateways the same divisions as they received prior to the reduction in rates effective as a result of the previous reports in this case. This will result in the following divisions of the rates to six principal cities involved:

	Divisions to Lines South of Gateways	Divisions to Lines North of Gateways
Baltimore, Md.	\$1.45	\$0.80
Harrisburg, Pa.	1.45	.80
Philadelphia, Pa.	1.45	1.30
New York, N. Y.	1.45	1.55
Stamford, Conn.	1.25	2.00
Boston, Mass.	1.25	2.00

Divisions to other points, whether related to the six points above or not, will be established upon a similar basis.

Reduction in Rates on Alabama Iron

The commission has also rendered a decision in the case of the Allen Mfg. Company et al vs. Louisville & Nashville Railroad Company et al., reducing the rate on pig iron in carloads from Birmingham, Ala., to Nashville, Tenn., from \$2 to \$1.65 and awarding reparation. The complainants in this case are a number of corporations manufacturing stoves and other cast-iron articles, the allegation being that the defendant carriers' rates on pig iron in carloads between the points mentioned are unreasonable and discriminatory.

In the Sloss-Sheffield Steel & Iron Company's case the commission found that the rates on pig iron from Southern producing points to the Ohio River crossings and to neighboring points including St. Louis and Chicago were unreasonable "to the extent that they exceeded rates which were not at least 35 cents lower than the rates then in effect" and accordingly ordered the rates reduced. The commission also stated that the then

existing differentials between Southern furnaces should be maintained, as should also the then obtaining relation of rates to the Ohio River crossings, to Central Freight Association territory and to the East. When the rate from Birmingham to Louisville was reduced from \$3 to \$2.65 no change was made in the Birmingham-Nashville rate of \$2 and the former differential of \$1 was thus reduced to 65c.

Upon the hearing of this case the defendant carriers have agreed to reduce the rates from Southern producing points to Nashville so as to restore the relationship existing prior to Oct. 1, 1914, but have declined to admit that the rates in question were unreasonable. The commission, however, finds that "the rates assailed were, and for the future will be, unreasonable to the extent that they exceeded or many exceed the rates established March 10, 1916; that complainants made shipments from Birmingham and paid and bore charges thereon at the rate herein found to have been unreasonable; that they have been damaged to the extent that the charges paid exceeded the charges that would have accrued at the rate herein found reasonable; and that they are entitled to reparation, with interest."

The amount of reparation due the complainants cannot be determined on the record, hence the commission has made an order directing the preparation of a statement showing the details of the shipments upon the basis of which the amount due will hereafter be decided.

W. L. C.

New Heroult Furnaces

New installations of Heroult electric furnaces licensed by the United States Steel Corporation are as follows:

The Dominion Steel Foundry Company, Ltd., Hamilton, Ont., will install four 6-ton furnaces for making war material. After the war, metal from these furnaces will be used to make wheels, tires and axles. This company at present is operating six 20-ton acid open-hearth furnaces, four of which were built in 1916. Three more such furnaces will be built in 1917.

Armstrong, Whitworth of Canada, Ltd., Longueuil, Que., will install one more 6-ton furnace, making three of this type and capacity. War material, as well as tires, wheels and axles constitute the product.

The Newport News Shipbuilding & Dry Dock Company, Newport News, Va., has contracted for a 6-ton furnace for making forging ingots and steel castings. This company at present operates a small converter for making castings.

The Imperial Munitions Commission of Canada will install 10 6-ton furnaces in a new plant at Toronto, Canada. The steel will be used for making war material. Charles P. Perin and S. M. Marshall are the consulting engineers.

The installation of the above six furnaces brings the total of this type operating or contracted for in the United States and Canada to 100.

New Snyder Furnaces

New installations of Snyder electric furnaces are announced as follows:

The Stearns-Roger Mfg. Company, Denver, Col., will install a furnace with a capacity of making 7 tons per day of steel for castings.

The Dayton Steel Foundry Company, Dayton, Ohio, is to install a second furnace with a capacity of 30 tons per day. This is about twice the capacity of the Snyder furnace this company now operates.

The Haynes Stellite Company, Kokomo, Ind., has contracted for three more furnaces to supplement the three Snyder furnaces it is now operating in making the high speed alloy, stellite. The Chile Exploration Company, New York, will put in a third Snyder furnace to make special alloys at its plant at Chuquicamata, Chile.

The Gulick-Henderson Company, consulting and inspecting engineer, with physical and chemical laboratories, has removed its general offices from 30 Church Street and 120 Broadway to suite 1932-1939 at 13-21 Park Row, New York.

The Edwards Wire Mill started a large unit at South San Francisco, Cal., Jan. 2, and is preparing to double its capacity.

Expansion of an Export House

T. S. Garrett has been placed in charge of the machinery department of Gaston, Williams & Wigmore, Inc., 140 Broadway, New York. He was formerly connected as secretary with the Puget Sound Machinery Depot, Seattle, Wash. The extension of the company's foreign business and connections is going forward steadily. It now has branches in London, Paris, Rome, Lisbon, Madrid, Cape Town, Tokio, Shanghai, Vladivostok, Petrograd, Moscow, Valparaiso, Havana and Rio Janeiro, and other branches are contemplated. It has been the policy of the company, wherever possible, to buy established houses in foreign cities, or at least purchase a substantial interest in them, rather than form an entirely new organization. In all cases it sends to its branches an American manager who is familiar with American products and methods, but the rank and file of the employees at each foreign branch are made up of natives of the country wherein the branch is located.

The company is now operating 14 ships, 10 of which it owns as the Gaston, Williams & Wigmore Steamship Corporation, and 4 of which it has under charter. It has 4 vessels under construction which will give it a fleet of 18. Its shipments of automobile trucks, aeroplanes and other equipment and machinery compel the maintenance of service departments in Europe, with the result that its total number of employees in Paris is no less than 1200, while in London it has 200. In China it is the representative of the Westinghouse Electric & Mfg. Company. In New York, and at its larger branches, the business of the company is departmentalized.

A building is being erected for the company on Cedar Street, New York, adjoining the building of the Guaranty Trust Company at 140 Broadway.

New Company Buys Canton Corrugating

The business of the Canton Corrugating Company, Canton, Ohio, will be taken over by a new corporation capitalized at \$1,000,000, to be known as the Canton Metal Products Company. Application for a charter for the new corporation has been made by its officers. The president and general manager will be Harry G. Bow, formerly manager of sales for the Berger Mfg. Company at Canton. R. L. Kreighbaum, advertising and sales promotion manager of the Berger Company for a number of years, will be vice-president and sales manager. H. L. MacKenzie, formerly manager of the jobbing department for the Berger Company, and for the past four years manager of the Canton Corrugating Company, will be treasurer. J. B. Immler will be secretary.

A full line of pressed steel building materials, including such sheet-metal goods as roofing, siding, shingles, eaves trough, conductor pipe and reinforcing plates, will be manufactured. New buildings of modern type will be erected in addition to the plant of the Canton Corrugating Company now taken over. The new structures are to be completed about April 1, at which time it is planned to operate with about 500 employees. The company now controls a 6½-acre site with railroad siding facilities. Executive offices will be maintained at 309 Daily News Building, Canton.

To Handle Iron and Steel Exports

F. W. Hall, of Edward Le Bas & Co., 82 Beaver Street, New York, exporters of iron, steel and metals, who has been in London since October, is again in New York to make permanent the New York office of the firm. The principal business of this office will be the buying and shipping of iron and steel and metals to Great Britain, British colonies and the Far East, but it is expected that various specialties will be put on the market in the United States. One of these is S. A. L. aluminum solder made by a subsidiary company, National Alloys, Ltd., of London. For export to Great Britain and some other countries the firm is handling boron-copper alloys, produced by the American Boron Products Company, Reading, Pa.

MUNITIONS PLANT DESTROYED

Hundreds of Thousands of Shells Destroyed in Canadian Car & Foundry Assembly Plant

The large shell-assembling plant of the Canadian Car & Foundry Company, comprising some 40 one and two story buildings at Kingsland, N. J., containing several hundred thousand 3-in. shrapnel and high-explosive shells for shipment to Russia, was destroyed by fire on the afternoon of Jan. 11. For at least four hours the exploding of the shells resembled a rapid-fire cannonading, which caused the residents of Kingsland and vicinity to flee for their lives, tied up traffic on the Boonton branch of the Delaware, Lackawanna & Western Railroad, and made any attempt at fighting the fire impossible. The loss is estimated at \$17,000,000, but, as far as is known, no lives were lost.

Made elsewhere, the shells were delivered to Kingsland for loading, and were prepared for use except the attachment of fuses. As fast as the cases were loaded with trinitrotoluol they were set aside, point upward, in cases. As the heat became intense the propelling charges, which were intended to project the shell from the gun, exploded, sending the projectiles high in the air, but not causing them to explode. Nevertheless, great damage was done to surrounding property. Several investigations are under way to determine responsibility for the fire. No charge of incendiarism has been made, although it is stated to be a possibility. The people of Kingsland are opposed to the rebuilding of the plant, and an official statement says that it may not be reconstructed. A statement of which the following is a part was issued by the Canadian Car & Foundry Company:

The buildings destroyed were valued at about \$750,000. The value of the contents of the buildings destroyed amounted approximately to \$16,000,000. The company was protected to the amount of about \$3,000,000 in insurance on the buildings and contents. The rest is a total loss, of which about \$6,000,000 is the loss of the company.

An examination into the circumstances attending the origin of the fire has created the impression that it is possible, if not probable, that the fire was of incendiary origin. The officers of the company do not wish to make any further definite statement with regard to this until the investigations are completed. It is quite possible that the buildings will not be reconstructed.

The entire plant was most carefully guarded. Every safeguard known to science had been installed, and every possible provision made to safeguard the adjoining premises against injuries resulting from explosion. The company had secured insurance in favor of the inhabitants of Kingsland, which, we understand, will more than cover any loss or damage to buildings in that town. The reports with regard to the fire are somewhat exaggerated and sensational.

American Chain Company's Plans

The American Chain Company, Bridgeport, Conn., which recently purchased the Standard Chain Company of Pittsburgh, has organized that company's plant and business into its welded chain department. It now has under way at the various plants a number of enlargements. It is also constructing a new plant to be devoted to the manufacture of ship cable chain. In connection with this expansion it has just increased its capital stock from \$4,000,000 to \$10,000,000. The company will open an office in New York City at the Grand Central Terminal about Jan. 22.

Casting High Speed Steel Tools

The High Speed Tools Corporation, New York, has recently taken over the plant of the Boerder Process Steel Company, Toledo, Ohio. The company's product is cast steel high speed tools, which it is claimed compare in density, soundness, toughness and edge-holding qualities with forged hand-machined tools. Anton Boerder, the inventor of the process, is the general manager of the plant. Tools of various sizes and shape are cast in sand molds, the average product containing about 18 per cent tungsten, 3½ to 4 per cent chromium and 0.50 to 1 per cent vanadium.

Pittsburgh and Nearby Districts

Reports printed in local journals state that the Youngstown district payroll for December was \$4,589,853, bringing the total for the year to \$42,254,202, an amount far exceeding local wage distributions in any previous year. The distribution in 1915 was \$29,992,603; in 1914, \$28,401,334, and in 1913, \$33,533,815.

The January meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel in that city on Monday evening, Jan. 15, preceded by a dinner. James A. Wakefield, attorney, who has recently returned from the battle front of Europe, gave a talk on the battle of Mons.

A meeting of the stockholders of the Standard Underground Cable Company will be held in the Westinghouse Building, Pittsburgh, Jan. 23, to vote on a proposed increase of the capital stock from \$3,700,000 to \$10,000,000. It is unofficially stated that the company will soon declare a stock dividend.

F. E. Peabody, who recently resigned as sales manager of the coal and coke department of the American Steel Company, Park Building, Pittsburgh, has organized the Riley-Peabody Fuel Company. He has purchased and turned over to the new company the coal and coke business of the American Steel Company, including its stock in the American-Connellsville Coal & Coke Company. Eugene S. Riley, who resigned as president of the American Steel Company last August, is president of the Riley-Peabody Fuel Company; F. E. Peabody is treasurer, and L. P. Monahan is secretary. The company has its office in room 408, Frick Building, Pittsburgh.

The Homestead Valve Mfg. Company, Pittsburgh, has appointed the following agents to represent it in their immediate vicinities: Seeger-Walraven Company, Atlanta, Ga.; Joplin Supply Company, Joplin, Mo.; George T. Matthews & Co., St. Louis, Mo.

The annual meeting of the Structural Section of the Engineers' Society of Western Pennsylvania was held in its rooms in the Oliver Building, Pittsburgh, last week. Officers were elected as follows: Chairman, George W. Nicholas, engineer S. C. Webb Company; vice-chairman, R. A. Pendergross, engineer McClintic-Marshall Company. Directors, W. Hendrix, with Pittsburgh-Des Moines Steel Company; E. V. Braden, with Pittsburgh, Chartiers & Youghiogeny Railroad Company, and A. F. Gordon, assistant engineer, bureau of building inspection, Pittsburgh.

At the annual meeting of stockholders of the American Spiral Spring & Mfg. Company, Pittsburgh, held last week, John Pfeil, L. L. Wolfe, William McConway, Jr., J. S. Thomas and Robert E. L. Bailey were elected directors.

Stockholders of the Wilkoff Company will meet at Youngstown, Ohio, Feb. 6, to vote on a proposed increase in the capital stock from \$300,000 to \$600,000 to provide funds for plant extensions.

The Valley Star Stove Company, Wheeling, W. Va., has been taken over by a different management, composed of men experienced in the stove and foundry business. The foundry has been moved to much larger quarters. The old line of B. Fisher and Joseph Bell will be manufactured. The B. Fisher line was a pioneer of the Ohio Valley in coal stoves. Good orders have been booked and the plant is now in operation. H. B. Repetto is president and general manager.

The Griffin Mfg. Company, manufacturer of cold-rolled strip steel, Erie, Pa., is erecting an annealing and heat-treating building, 108 x 152 ft., of steel and brick construction.

The General Electric Company will erect next summer at Erie, Pa., a brick and steel machine shop, 210 x 400 ft., to be devoted to the manufacture of rotary converters. It will have an 80-ft. main high bay, an 80-ft. bay with gallery and a 40-ft. lean-to along one side for stock rooms, etc. M. Griswold, Jr., is plant manager.

Contracts for run-of-mine coal for delivery over all of 1917 are being made, it is reported, as high as \$3.25

at mine. The United States Steel Corporation has a long time contract with the Pittsburgh Coal Company, by which it secures coal for the different plants of its subsidiary companies at a price much lower than the above.

The Lima Metals Foundry Company, Lima, Ohio, recently incorporated with a capital stock of \$15,000 to specialize in brass, bronze and aluminum castings, has elected A. H. Workman, president; J. F. Racine, vice-president, and W. J. Noonan, secretary and treasurer.

Plans for the merger of the Union Switch & Signal Company, Swissvale, Pa., and the Westinghouse Air Brake Company, Wilmerding, Pa., both near Pittsburgh, have been formally declared effective. At a special meeting of directors of the Westinghouse Air Brake Company, Jan. 12, it was announced that practically all of the stock of the Union Switch & Signal Company had been deposited in assent. The directors of the Westinghouse Air Brake Company have called a special meeting of stockholders, March 15, to ratify the merger, and also to approve an increase in the capital of the company from \$20,000,000 to \$30,000,000 to finance the transaction. Out of the increase in capital it is proposed to declare a stock dividend of 2 per cent to holders of stock in the Westinghouse Air Brake Company, including the shares exchanged for stock in the Union Switch & Signal Company.

The Standard Sanitary Mfg. Company has given a contract to the Faber Engineering & Construction Company, Bessemer Building, Pittsburgh, for three enameling furnaces to be installed in its plant on the North Side.

The Jones & Laughlin Steel Company has placed a contract for two 75-ton and seven 10-ton electric cranes, to be installed in its Soho works, Pittsburgh.

For some time the Brier Hill Steel Company, Youngstown, has been operating its Thomas works at Niles, Ohio, to only partial extent. Commencing Sunday, Jan. 14, this plant, which contains 17 hot sheet mills, began to be operated in full. The Empire works, also at Niles, containing 10 hot sheet mills, which have been idle for some time, is expected to be put in operation on Sunday, Jan. 21. The company several months ago acquired the Western Reserve Steel Company at Niles, and this plant, which has also been idle for some time, is expected to start up on Sunday, Jan. 21. It contains five hot sheet mills and a 60-in. jobbing mill. The Brier Hill Company recently purchased a 25-ton electric crane to be installed in its open-hearth plant in Youngstown.

The plant of the Standard Sheet Metal Mfg. Company, Washington, Pa., which has been idle for a long time, was sold at receiver's sale last week for \$21,000 to the guaranty board of the Board of Trade of Washington. No plans are under way for starting up the plant.

At the annual meeting of stockholders of the Wheeling Mold & Foundry Company to be held in Wheeling, W. Va., Jan. 25, stockholders will be asked to authorize an increase in the capital stock from \$1,000,000 to \$1,500,000. The additional stock, if authorized, will be preferred, carrying 8 per cent dividend.

The Youngstown Sheet & Tube Company has recently purchased about 200 acres of land lying partly on the north and partly on the south side of the Mahoning River near its blast furnaces and steel works at East Youngstown. The price paid for the property is said to have been about \$300,000. This ground will be used for future extensions, the exact nature of which has not been disclosed.

On Feb. 1 the Brier Hill Steel Company will pay off \$2,168,060 of outstanding bonds. Of this amount \$200,000 matures on Feb. 1, and will be retired at par, while the remainder has been called at \$103 and interest.

After an idleness of 10 years, operations will be resumed Feb. 1 at the plant of the Penn Iron Company, Lancaster, Pa. Steel bars will be rolled at the mill, which has been bought by New York interests.

Machinery Markets and News of the Works

EXPORT TRADE PROMISING

Canada's Larger Need for Tools Growing

Domestic Demand Largely Confined to Single Tools, but Aggregate of Purchases Is Good

There are indications that export inquiries are becoming more numerous. In Cleveland the dealers are receiving inquiries from machinery houses in Europe, Japan and South America. New York sellers are giving more attention to soliciting export trade. Exports continue to be hampered by the scarcity of ocean freight space, and in New York not a few tools are in storage. Stability in prices is more or less a requisite in doing an export business, inasmuch as by the time an order is received, after extended negotiations, prices may have been advanced two or three times.

Canada appears to be a promising field. At Lindsay, Ont., 1400 men are working on the arsenal which is being constructed for the Imperial Munitions Board. It will consist of 60 buildings. A steel buyer states that the Dominion has about reached the limit of its steel-making capacity. Canadian consumers are buying materials here and contemplate the installation of steel-making furnaces, all of which suggests that Canada is far from being saturated with machine tools.

The domestic demand for machine tools is largely confined to single tools wanted in diverse directions, but it is generally conceded that business of this character is sufficient to make a satisfactory total.

The Milwaukee report says that labor is more plentiful in that district, although highly skilled mechanics are still held at a premium.

The shipbuilding plants of the Pacific Northwest are steadily inquiring for equipment, but the general demand is quiet. Shops in that section which have not bought for one reason or another are seriously in need of machinery.

Machine tools which are not classed as strictly standard are easier of delivery, but those of the highest class cannot be secured promptly.

New York

NEW YORK, Jan. 17, 1917.

The domestic demand for miscellaneous machine tools is a little lighter, but the large export houses report that they are doing an active and satisfactory business, one of the latter receiving orders aggregating \$100,000 on a single day this week. Local sellers have begun to go more vigorously after export sales, and not without success. Some attractive business for Russian delivery is pending.

One of the present-day difficulties in selling for export is illustrated by the case of a manufacturer of presses who received an inquiry several months ago for two small machines. He forwarded the necessary information and quotations, together with a code word to facilitate the placing of an order by cable. This week he received an order by cable, but meanwhile his prices had advanced 20 per cent. To explain the situation to the South American buyer would have meant further delay of two or more months, so he decided to be liberal with the buyer and make delivery at

the price first quoted, taking care, however, to inform his customer by letter of the favorable terms he was getting.

Another phase of the export situation is that a few exporters have been unable to find ocean space for machines wanted by their foreign clients, with the result that the tools are now in storage in New York, unless they have been resold, the latter usually at a profit.

The Franco-American Commerce Company, 21 Park Row, New York, with a branch in Grenoble, France, has foreign inquiries for several precision lathes, one slotting machine, one planing machine, one 16-in., one 18-in. and one 20-in. turret lathes, a surface grinder and milling and drilling machines, including some of the multiple spindle type; also reamers, twist drills, milling cutters, taps and dies, hack saw blades, etc. The company desires to receive two catalogs from manufacturers covering the lines named, and is particularly interested in tools and equipment which can be shipped promptly. The technical department of the company is in charge of E. J. Hubaux.

Deliveries of all tools are distinctly easier, and this is particularly true of some which are not classed as strictly standard.

Karaeuter & Co., Inc., 563 Eighteenth Avenue, Newark, N. J., is in the market for an automatic board drop hammer of 300 or 400 lb.

The National Bridge Works, Review Avenue, Long Island City, N. Y., will purchase a plate shear with a capacity of 36 in. x 1 in. plates.

H. W. Cotton, Inc., Woolworth Building, New York, recently incorporated with a capital stock of \$600,000, has taken over the business formerly conducted by H. W. Cotton in the Bush Terminal Building, 34 Thirty-fifth Street, Brooklyn. The plant there has 12,000 sq. ft. of floor space. The company is now placing on the market a bench lathe and surface grinder and a bench grinder of cylindrical type for internal and external work. Part of the plant is devoted to the manufacture of special and automatic machinery, also jigs, fixtures and gages as well as thread gages. H. W. Cotton is president; William A. Courtland is vice-president and W. B. Morrell is secretary.

The Bell Locomotive Works, 30 Church Street, New York, recently increased its capital stock from \$20,000 to \$50,000 to provide additional capital for increasing its manufacturing facilities at Lincoln, N. J., and to make available additional working capital.

The Majestic Motor Company, 1790 Broadway, New York, at present is manufacturing its eight-cylinder automobile at its plant in the city. At such time as it does build its own plant it will probably locate either in Long Island City or the Bronx. The company was capitalized recently at \$1,000,000. F. A. Kateley is vice-president and general manager.

The Goodman Auto Body Company, 1737 Broadway, New York, builder of special automobile bodies, has increased its capital stock from \$5,000 to \$25,000 in order to take care of its increased business. Henry Goodman is president.

The Motor Car Equipment Company, 21 West Sixty-second Street, New York, has increased its capital stock from \$50,000 to \$550,000 in order to prepare for an expansion of its business which it expects to put into effect this year. The company is a manufacturer and wholesaler of automobile equipment. J. A. Abeles is general manager.

The Surface Combustion Company, incorporated a few months ago with a capital stock of \$600,000, has established its factory and laboratory at 15 Wilbur Avenue, Long Island City, N. Y. It manufactures ovens, furnaces and fuel-burning apparatus for burning gaseous mixtures, liquid and other fuels. W. B. Greeley is president, Linzee Blagden is treasurer and Charles E. Richardson is secretary. Eugene E. Basquin is general manager.

Helios Metal Works, 213 Grand Street, New York, incorporated in September with a capital stock of \$25,000 by E. R. Lightbourne and others, has since then entirely changed hands. The present officers are E. A. W. Murray, president, and Roy F. Segur, secretary.

The Steward Davit & Equipment Corporation, 17 Battery Place, New York, incorporated a few months ago to begin business with \$22,500, has established a fully-equipped shop for the manufacture of mechanical davits and lifeboat gear, chock fittings, releasing hooks and lowering drums. R. B.

Steward is president, T. O. Martin, vice-president; J. C. Cottrell, secretary and treasurer, and H. B. Patterson, engineer.

The Pierce, Butler & Pierce Mfg. Company, J. P. Duryea, manager, Bronxville, N. Y., will erect a two-story addition to its plant at Eastwood, N. Y., to cost \$175,000. Preliminary plans have been completed.

The Vulcanite Mfg. Company, Lindenhurst, N. Y., is having plans prepared for an addition to its plant, having recently increased its capital stock from \$100,000 to \$200,000 for this purpose.

The Butterworth-Judson Company, Newark, N. J., manufacturer of chemicals, will build two one-story additions, 46 x 94 ft., and 41 x 47 ft., to its plant on Avenue R.

F. S. Gassaway, Newark, N. J., has been incorporated with a capital of \$100,000 to manufacture electric storage batteries. William A. Smith, L. S. Woodruff and F. I. Ennis are the incorporators.

The American Oil Export Company of New York has acquired property at Port Newark Terminal, Newark, N. J., and plans a plant for compounding oils. The company operates a refining plant at New Orleans, La.

The Matthews Steel Company, Newark, N. J., has been incorporated with a capital of \$50,000 to deal in iron and steel goods. Stanley E. Matthews, John and John S. Swenson are the incorporators.

The Walker-McKinley Company, Newark, N. J., has been incorporated with a capital of \$100,000 to manufacture soap cups and metal soap dispensers. Russell T. Binder, Orange; Louis Walker and Frank A. McKinney, New Brunswick, are the incorporators.

The General Leather Company, Newark, N. J., will build a one-story brick boiler plant addition to its factory at 418 Frelinghuysen Avenue to cost \$2,500.

The Manufacturers Tire & Rubber Company, Newark, N. J., has been incorporated with a capital of \$100,000 to manufacture automobile tires and rubber specialties. Eric Windmiller, 335 Belmont Avenue, Herman Feder and Justin S. Galland are the incorporators.

The General Electric Company, Harrison, N. J., has filed plans for the erection of an addition to its incandescent lamp works at South Fifth and Bergen streets to cost about \$250,000.

The Driver-Harris Wire Company, Harrison, N. J., has arranged for the opening of a new plant for the manufacture of electric wires at Manchester, England, under the name of the Driver-Dennan-Cooper Company. The factory will be of the nature of a finishing plant to handle raw materials shipped from this country. Frank L. Driver, president, has left for England to be present at the opening of the new branch.

The Crucible Steel Company, Harrison, N. J., has had plans prepared for an addition to its present plant, to be erected between Sixth and Seventh streets at a cost of about \$200,000.

The Hyatt Roller Bearing Company, Harrison, N. J., is reported planning the erection of new additions to its plant on Middlesex Street during the coming year to provide for its rapidly increasing business.

Harry Cossey, Tottenville, Staten Island, N. Y., is planning an addition to his shipbuilding plant on Front Street to double the present capacity.

The Hudson Metal & Iron Company, Bayonne, N. J., has filed plans for a one-story addition to its plant at Thirty-third Street and Prospect Avenue to cost \$1,500.

The Bayonne Casting Company, Bayonne, N. J., specializing in monel metal, steel, and bronze castings, has taken out a permit to build a one-story addition to its plant at Oak and Ingham avenues, to cost \$3,500.

The Coats Machine & Tool Company, Jersey City, N. J., will build a one-story addition to its plant at 276-280 Slip Avenue to cost about \$1,000.

The Roessler & Hasslacher Chemical Company, Perth Amboy, N. J., has commenced the erection of an addition to its plant on Rector Street, four stories. A new one-story brick and steel structure will also be erected on the west side of the street. The company, it is said, is considering plans for further extensions to its plant to cost about \$1,000,000.

The Asbestos Textile Company, Woolworth Building, New York, is in the market for a cross roll machine, new or second-hand, for tubing from $\frac{3}{8}$ -in. to 2-in. diameter, United Engineering & Foundry Company type preferred.

The General Electric Company, Schenectady, N. Y., has completed plans for a two-story foundry building, 125 x 525 ft., estimated to cost \$400,000. C. G. Hulth is superintendent of construction.

Philadelphia

PHILADELPHIA, PA., Jan. 15, 1917.

The North American Motors Company, Pottstown, Pa., which was incorporated Nov. 28 to manufacture gasoline motors for automobiles, and for general machine work, has bought the assets of the Potter Mackie Mfg. Company, with a factory in Pottstown, Pa., and the North American Motor Company, a partnership manufacturing gasoline motors. This spring and early summer it expects to build a plant on a four-acre plot which it has bought on Queen Street, Pottstown, which will be suitable for its work, the manufacture of 45, 30 and 20-hp. motors for commercial vehicles. The motor has been on the market for 10 years, and thousands are in use. It was formerly manufactured in Rochester, N. Y., and was known as the Hazard motor. The company is developing its business along conservative lines, not accepting large contracts but rather preferring to keep its contract commitments well in hand owing to the scarcity of material. It is manufacturing a motor that requires very accurate machine work and consequently must be assembled with great care. Among those active in the merger are George R. Bidwell, president of the North American Motor Company, and John R. McGinley of Pittsburgh, chairman of the board of directors of the Chicago Pneumatic Tool Company.

It is reported that the Standard Fuse Company, Borden-town, N. J., is planning for the removal of its plant to Canada, on a site recently selected.

The contract for the erection of an eight-story addition to the plant of the Hale & Kilburn Company, Eighteenth Street and Lehigh Avenue, Philadelphia, has not been awarded to Cramp & Co., as stated in THE IRON AGE of Jan. 4. No award has been made as yet.

The Schwarz Wheel Company, Margaret Street, Philadelphia, manufacturer of automobile wheels and parts, has acquired property about 160 x 200 ft., adjoining its plant, to be used for extensions.

The Otto Martin Company, Philadelphia, has been incorporated with a capital of \$20,000 to manufacture printing implements. Ottilie L. Martin is principal incorporator.

The David Lupton's Sons Company, Allegheny Avenue and Tulip Street, Philadelphia, manufacturer of steel sash, etc., has filed plans for a one-story addition, 210 x 285 ft., at Westmoreland and Witte streets to cost about \$15,000.

The Link Belt Company, Philadelphia, has awarded a contract for the erection of a one-story machine shop and crane runway, 210 x 220 ft., at a cost of \$164,000. The William Steele & Sons Company, 1600 Arch Street, is the contractor.

The Tioga Steel & Iron Company, Philadelphia, will build a one-story boiler room addition to its plant at Fifty-second Street and Gray's Ferry Road.

Fire Jan. 6 destroyed the car barns, electric power plant and storage buildings of the Eastern Pennsylvania Light, Heat & Power Company, Palo Alto, near Pottsville, Pa., with loss of about \$500,000. The plant will be immediately rebuilt. C. A. Greenidge, Pottsville, is president.

The E. T. Fraim Lock Company, Lancaster, Pa., manufacturer of locks, vaults and safes, has acquired land adjoining its plant for the erection of an addition to double the present capacity.

The International Motorcar Company, Allentown, Pa., is building an addition to its plant to provide an increase in capacity from 75 to 100 auto trucks a month, ranging from 3 to 8 tons capacity.

The Bethlehem Motor Corporation, Allentown, Pa., recently organized, is arranging to erect the initial buildings of its proposed plant for the manufacture of automobile trucks, on property acquired along the New Jersey Central Railroad. It is said that the plant will be equipped to produce 2000 trucks the present year. Martin E. Kern, vice-president of the Penn Counties Trust Company, is president.

Fire recently destroyed the boiler plant of the Reliance Colliery of the Philadelphia & Reading Coal & Iron Company, Mount Carmel, Pa., with loss estimated at \$8,000. The plant will be immediately rebuilt.

Bids have been asked by the Bethlehem Steel Company, Sparrows Point, Md., on the construction of a new shearing plant, 1066 ft. long.

With \$100,000 capital stock the J. L. Pitte Tie & Lumber Company, Richmond, Va., has been incorporated. Lindsey Pitts, Scottsville, Va., is secretary.

Fire recently destroyed one of the wooden buildings at the projectile plant of the Bethlehem Steel Company, New Castle, Del.

Shiller & Nolan, 820 Cherry Street, Philadelphia, has awarded contract for the construction of a two-story and basement machine shop, 33 x 67 ft., estimated to cost \$6,000. Neubauer & Boyd, 1118 Chestnut Street, are the architects.

New England

BOSTON, MASS., Jan. 15, 1917.

The American Steel & Wire Company is to build a wire-mill mill, 70 x 334 ft., one story, at its Central Works, Worcester, Mass.

Albert M. Powell, formerly of the Powell Machine Company, Fitchburg, Mass., has organized a new corporation with a capital stock of \$50,000 to manufacture machinery, especially planing machines. The officers of the new corporation will be chosen from men connected with the Standard Plunger Elevator Company, Worcester, Mass., in whose plant the business of the new company will be carried on.

The Berlin Construction Company, Berlin, Conn., has been incorporated with capital stock of \$300,000 by George H. Sage, Seymour N. Robinson and Daniel E. Bradley, all of Hartford. The company is chartered to design, erect and repair steel bridges and buildings.

The Penn Seaboard Steel Corporation, New Haven, Conn., has awarded the contract for the erection of a factory building, 39 x 400 ft., one story.

The Worcester Machine Works, Worcester, Mass., has taken another floor in the Baker Building, 25 Bartlett Street, to make room for its growing business in the manufacture of machine parts. Winfred S. Griffiths is the proprietor.

The New England Drawn Steel Company, Mansfield, Mass., has awarded a contract for the erection of two buildings, one 50 x 250 ft., the other 44 x 50 ft., one story.

The R. Wallace & Sons Mfg. Company, Wallingford, Conn., is to build a steel department building, 100 x 170 ft., four stories, and 100 x 100 ft., one story. The company has recently completed the erection of a new machine shop, 50 x 150 ft., one story.

The Van Norman Machine Tool Company, Springfield, Mass., by vote of its stockholders, is to increase its capital from \$400,000 to \$1,000,000. It is expected that both plant and equipment will be considerably enlarged.

The Flagg Marine Signal Company, Worcester, Mass., has been incorporated with capital stock of \$100,000 to manufacture the Flagg safety fog horn. The factory location has not been decided upon. J. Walter Flagg, Worcester, is president and treasurer.

The Driscoll Wire Company, Shelton, Conn., has been incorporated with capital stock of \$30,000 to do wire drawing and manufacture wire products. The incorporators are William F. Driscoll, Ansonia; Edward E. Gardner, Shelton, and Charles Marvin, Derby.

The Eweld Mfg. Company, Milford, Conn., has been incorporated with authorized capital stock of \$50,000 to manufacture machinery. The officers are A. T. Clark, Boston, president; J. L. McLean, Boston, vice-president; M. B. Ryan, Milford, treasurer.

The Eagle Lock Company, Terryville, Conn., it is reported, is to ask permission to increase its capital stock from \$1,000,000 to \$5,000,000.

The Seifert Special Machine Company, Hartford, Conn., has filed a certificate of incorporation with authorized capital stock of \$50,000. The incorporators are T. E. Canfield, M. A. Thorpe and E. T. Canfield.

E. Ingraham & Co. Inc., Bristol, Conn., has voted to increase its capital stock from \$500,000 to \$2,000,000.

The Lux Clock Mfg. Company, Waterbury, Conn., has been incorporated with authorized capital stock of \$50,000 by Paul Lux, Fred Lux and Herman Lux. It will commence business with \$15,000.

The Eastern Machinery Company, Stiles Street, New Haven, Conn., is to build an addition, 90 x 200 ft., one story.

The Traut & Hine Mfg. Company, New Britain, Conn., has awarded a contract for an addition, 40 x 50 ft., one story.

The Harley Company, Springfield, Mass., has been re-organized and its capital stock increased from \$50,000 to \$1,200,000. It is understood that the stock will be retained by the Hendee Mfg. Company and that none will be sold for the present. The directors are Leon J. Harley, president; Leon J. Harley, Jr., treasurer, and C. H. Beckwith.

The Aberthaw Construction Company, Boston, Mass., has been incorporated with capital stock of \$300,000. The directors are Leonard C. Wason, 1530 Beacon Street, Brookline, president and treasurer; M. C. Tuttle and J. V. Dennett.

The W. H. Bagshaw Company, Lowell, Mass., manufacturer of talking machine needles, etc., has filed a certificate of incorporation with authorized capital stock of \$75,600. The directors are Charles H. Bagshaw, president; Margaret C. Bagshaw, 371 Stevens Street, Lowell, treasurer, and W. J. Bagshaw.

The Independent Machine & Tool Company, Boston, Mass., has been incorporated with authorized capital stock of \$50,000. The directors are John G. Cowle, president; George Y. Young, Jr., treasurer, and Jane A. Hay.

The Evans Friction Cone Company, Newton, Mass., has filed a certificate of incorporation with authorized capital stock of \$10,000. The directors are Winifred L. Evans, Melrose, president and treasurer; R. G. Page and G. Cheyne.

The J. P. Eustis Mfg. Company, Cambridge, Mass., has been incorporated with capital stock of \$103,000, to deal in brass, iron, steel and metal goods. The directors are Edward W. Casey, president; John P. Eustis, Ames Street, Cambridge, treasurer; and F. O. White.

A. O. Norton, Inc., 286 Congress Street, Boston, Mass., has awarded a contract for a machine shop, 85 x 225 ft., one and two stories.

The Fess Rotary Oil Burner, Boston, Mass., has been incorporated with capital stock of \$525,000. The directors are Albert A. Richards, president; Norman J. MacGaffin, 53 State Street, Boston, Mass., treasurer; Robert L. Hosmer.

The Bliss-Holbrook Company, Attleboro, Mass., has been incorporated with capital stock of \$10,000, to manufacture metal trimmings. The directors are C. A. Holbrook, president; Edward N. Bliss, treasurer; and E. B. Palmer.

The Davis & Furber Machine Company, North Andover, Mass., has begun the erection of a foundry addition, 150 x 200 ft., one story.

Chicago

CHICAGO, ILL., Jan. 15, 1917.

The Fruin Drop Forge Company has had plans prepared for a one-story extension to its factory, 24 x 60 ft., at Root Street and Stewart Avenue, Chicago.

The Automatic Screw Machine Products Company, 416 West Grand Avenue, Chicago, will shortly have its plans completed for the factory it is to build at Cicero, Ill.

The Chicago Auto Painting Company, 2441 South Michigan Avenue, Chicago, builder of automobile bodies, will build a three-story factory, 46 x 124 ft., at Michigan Avenue and Twenty-fourth Street. The work is in charge of M. Zutman and the building cost is estimated at \$30,000.

The International Harvester Company, Chicago, has taken out a building permit providing for a one-story machine shop, 90 x 100 ft. W. D. Price is the engineer in charge.

The Studebaker Corporation has just acquired the plant of the Staver Carriage Company at Seventy-sixth and Wallace streets, Chicago. The plant is equipped for the manufacture of automobiles and will be used by the Studebaker Corporation as an assembling plant.

The Hurley Machine Company, Clinton and Monroe streets, Chicago, advises concerning the property recently purchased on which it will erect a three-story factory, that the building will have a floor area of 240,000 sq. ft., and a daily capacity of 3000 Thor washing machines. Jarvis Hunt is the architect and is in charge of the purchase of all equipment.

The Argo Iron & Metal Company, Chicago, has been incorporated with a capital of \$20,000 by George C. Knauff, Samuel Steinberg and George Rosenberg, and can be addressed in care of George C. Knauff, 1319 West Fifty-fifth Street.

The Belleville Malleable Iron Company, Belleville, Ill., has been incorporated with a capital of \$150,000 by Paul Joguel, E. Hertzog and George B. Logan of St. Louis, and property has been leased for the new company's occupancy.

The Wray Pneumatic Pump Company, Rock Island, Ill., has been organized with a capital of \$21,000 to manufacture a pneumatic pump for household use. The incorporators are James L. Wray, Dr. N. M. Moore and C. R. Chamberlain.

The Sioux City Tire & Mfg. Company, Sioux City, Iowa, has secured a new location in that city and a factory will be built as rapidly as weather permits. C. S. Skirwin is president.

The Great Northern Railroad has announced its expectation of spending approximately \$1,000,000 in the extension of its shops at Superior, Wis., St. Cloud and Great Falls, Mont., and some of the building contracts have already been let. The company has taken prices on a large list of machine tools.

The Twin City Belt Line Railway Company, St. Paul, Minn., has been incorporated with a capital of \$100,000 and will construct a belt line serving the railroads entering the Twin Cities. Ralph Budd, assistant to L. W. Hill of the Great Northern Railway Company, is president.

Cleveland

CLEVELAND, OHIO, Jan. 15, 1917.

The market has been unusually quiet the past week, but considerable new inquiry has come out, mostly for single tools. After the inventory period is over greater activity is expected. Dealers are receiving considerable inquiry from machinery houses in Europe, Japan, South America and other countries for small lots of tools. A moderate amount of second-hand machinery is coming out, which is disposed of about as soon as offered.

While the Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has had a very disastrous fire, as recently reported, a large portion of its factory facilities remain intact. The machine shop and the stock room for small stores were burned. The roof and windows of the erecting shop were destroyed; but the walls are in good condition. The 25-ton electric crane in the erecting shop is undamaged with the exception of the motor. A number of the buildings were not affected by the fire. The office, wood and pattern shop and all warehouse buildings remain as before. No part of the power house was damaged except the falling of the smoke stack, which has already been replaced. The company has moved its machines into some of these buildings and has begun operations on them. It has also completed arrangements to have part of its work done elsewhere for the time being. It is, therefore, getting its work under way again.

The Ohio Forge Company, 2186 East Sixty-fifth Street, Cleveland, has acquired a 4 acre site along the Belt Line Railroad at Woodhill and Kinsman roads, where it will shortly begin the erection of a new plant, including two forge shops, 70 x 150 ft. and 40 x 140 ft., respectively; a power house, machine shop, heat-treating plant and office building. A steam power plant will be installed and some other equipment will be purchased.

The Vulcan Forge Company, Sandusky, Ohio, recently incorporated with a capital stock of \$350,000, has acquired a 10-acre site on which it will shortly begin the erection of a plant to make steel forgings, particularly for the automobile trade. A forge shop, 66 x 200 ft., die room and power plant will be erected. The equipment will include 7 steam and 3 board drop hammers, 10 trimming presses, 2 forging machines, 10 furnaces and a number of machine tools for the die room, heat-treating and power plant. The officers are C. H. Lowe, president; Theodore Olderman, vice-president; Chester Day, secretary and treasurer, and James Grieve, sales manager. The first three have been connected with the Timken-Detroit Axle Company, Detroit, Mich.

The American Steel & Wire Company, Cleveland, has an inquiry out for several machines for the shops of the Donora & Southern Railroad.

The Cleaner Mfg. Company, Cleveland, has been incorporated with a capital stock of \$25,000 to make suction cleaners. J. H. Smart, George Wyman and others are the incorporators.

The Economy Metal Stamping Company, Cleveland, has been incorporated with a capital stock of \$200,000 by Richard Ryan, E. H. Arnold, F. W. Smith and others.

The Standard Pattern Works, Canton, Ohio, is the name of a new industry being organized to erect a plant to manufacture wood patterns. A building 34 x 100 ft. will be erected. H. F. Johnston, formerly superintendent of the Canton Foundry & Machine Company, is organizing the company and will be its manager.

The Holmes Automobile & Mfg. Company, Canton, recently organized to manufacture automobiles with air-cooled engines, announces that it will shortly begin the erection of a reinforced concrete factory, providing 120,000 sq. ft. of floor space. Arthur Holmes, for a number of years chief engineer of the Franklin Motor Car Company, Syracuse, N. Y., is president of the company, which will be incorporated with a capital stock of \$2,500,000.

The new malleable iron foundry of the Timken-Detroit Axle Company in Canton, Ohio, is nearing completion and it is expected that it will be ready for operation some time next month.

The National Artificial Refrigerator Company, Wapakoneta, Ohio, maker of ice and refrigerating machines, has an inquiry out for machine-tool equipment, including 3 drill presses, 3 grinding machines, a radial drilling machine, turret lathe, screw machine and horizontal and vertical boring mill. Arthur Geisler is manager.

The Ticket Counting Machine Company, Lorain, Ohio, has been organized by J. W. Coulter, with a capital stock of \$30,000, to manufacture counting machines.

The Firestone Tire & Rubber Company, Akron, Ohio, is erecting a five-story and basement building, 60 x 240 ft., the first floor of which will be used for a machine shop and

the upper floors by the pattern department, plumbing and tin shop, etc.

The Belmont Motor Car Company, Toledo, Ohio, has been incorporated with a capital stock of \$125,000 and has acquired a site on which it plans to erect a plant for the manufacture of automobiles. Arthur A. Lehr is president and general manager.

The Seiss Mfg. Company, Toledo, maker of automobile, bicycle and motorcycle horns and lamps, recently purchased the plant of the Toledo Plow Company, which is being remodeled to double the company's former capacity.

The I. T. S. Rubber Company, Elyria, Ohio, will enlarge its plant by the erection of a two-story and basement building, 50 x 96 ft.

Indianapolis

INDIANAPOLIS, IND., Jan. 15, 1917.

The Federated Motors Company, Indianapolis, has been incorporated with a capital stock of \$5,000,000. A New York syndicate headed by Boughton & Co., 120 Broadway, New York, is underwriting the company which is a merger of the Pathfinder Company, and the Empire Automobile Company, manufacturers of automobiles at Indianapolis. W. C. Teasdale, president; W. E. Stalnaker, vice-president and W. K. Bromley, secretary of the Pathfinder Company, will occupy similar positions with the new company. The production of the new organization will be doubled.

The Farm Machinery Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture vehicles and farm implements. The directors are H. S. King, M. D. Baumgartner and L. L. Teegarden.

The Wonder Rug Cleaning Machine Company, Rochester, Ind., has been incorporated to manufacture machines for cleaning rugs. The directors are August Boelter, Norman R. Stoner and Frank H. Terry.

The Sedan Body Company, Union City, Ind., has been incorporated with \$125,000 capital stock to manufacture vehicles and vehicle parts. The directors are C. C. Adelsperger, A. G. Seiberling and C. C. Koontz.

The Hoosier Clay Products Company, Hillsdale, Ind., has been incorporated with \$225,000 capital stock to manufacture clay products. The directors are D. S. Strong, W. E. McKee and R. W. Sutton.

The Double Fabric Tire Company, Auburn, Ind., has been incorporated with \$900,000 capital stock to manufacture automobile tires. William H. Willenar, A. L. Murray and Simon J. Strauss are the directors.

The C. R. Folsom Iron Works, Walkerton, Ind., advises that its new steel fabricating plant will provide capacity for a large business in the building of steel oil-storage station tanks, as well as a general line of light steel fabricating work.

Detroit

DETROIT, MICH., Jan. 15, 1917.

Although orders for machine tools have been scattered the total volume has been large. Deliveries on standard machines require from three to seven months. General buying by automobile companies is still held up, due to the automobile shows. A number of small shops are starting business, however, and their orders are keeping the demand up to the average for this time of the year. The consensus of opinion is that the 1917 trade will exceed all previous years. The Harroun Motors plant at Wayne, Mich., is progressing rapidly, and equipment will probably be installed beginning Feb. 15.

The Charles A. Strelinger Company, Detroit, dealer in machinery and tools, will move Feb. 15 into a new building at 43-51 Larned Street, which will double its capacity. The new building will be devoted entirely to the sale of machinery.

Muskegon, Mich., has voted \$50,000 in bonds for water extensions and improvements.

The Sanitary Stem Flat Iron Company, Detroit, has been incorporated with \$100,000 by F. H. Wheeler, P. E. Muraine and Oliver E. Day, Detroit.

The Michigan Gear & Engineering Company, Detroit, has been incorporated with \$50,000 by Robert Wild, Newton B. Peterson and Herbert P. Lipman.

The Hamilton Motors Company has been incorporated with a capital stock of \$500,000. The company is established in a new plant at Grand Haven, Mich., and production of cars will begin Feb. 1. Guy Hamilton is designer of the car. Announcement of officers will be made shortly. The enterprise was undertaken by prominent stockholders of the Altec Motor Car Company.

Milwaukee

MILWAUKEE, WIS., Jan. 15, 1917.

The supply of medium-skilled and unskilled labor in the metal-working trades in the Milwaukee district is much improved. While highly skilled labor still is at a premium and scarce, shops are able to select their requirements of other labor and are meeting with much less difficulty than for the past six or eight months in manning their plants. Machine-tool builders report that new business is of such volume that little or no relief is in sight. Export demand is broadening; but domestic requirements are so imperative that not much consideration can be given to it. As the season advances, domestic business shows signs of broadening, too. Whereas demand for the last four or five months has been confined almost exclusively to one or a few tools, metal-working shops are attempting to place orders for lots of considerable size to equip additions to their plants. Numerous inquiries are noted for large lots for new industries about to be established. Deliveries cannot be guaranteed, except five or six months in advance, and buyers appear satisfied to write their specifications on this basis.

The automobile engine business developed by the Milwaukee Machine Tool Company, Milwaukee, during the last two years, has been organized as a distinct corporation under the name of LeRoi Company, with an authorized capital stock of \$350,000. The plant at Sixtieth Avenue and Mitchell Street, West Allis, is now being devoted exclusively to the manufacture of four and six-cylinder gasoline motors, and a large part of the present year's production already has been contracted for by several builders of automobiles and tractors. Charles W. Pendock, who has been chief engineer and general manager of the Milwaukee Machine Tool Company for the last three years, has been elected president and general manager of the LeRoi Company. J. Roy Frantz is vice-president, and Norman Christiansen is secretary-treasurer. Mr. Pendock was a designer of automobiles and engines in Great Britain prior to coming to America. The working force of the LeRoi Company is being enlarged. The machine-tool business of the Milwaukee company has been consolidated with that of the Kearney & Trecker Company, West Allis, which assumed control of the business several years ago.

The Hummel & Downing Company, Milwaukee, maker of paper and fiber boxes, will build a four-story addition, 100 x 410 ft., to its paper mill, to cost about \$250,000. James Carey, mechanical engineer, Chicago, is in charge of specifications for machinery.

The F. H. Holton Company, Chicago, manufacturer of band instruments, has accepted the proposition of the Commercial Club of Elkhorn, Wis., to relocate its plant and headquarters in that city. A fund of \$30,000 for the purchase of a four-acre site, it is stated, has been raised, and a factory will be erected at once. The plant will employ between 225 and 250 skilled workmen.

The Acme Brick Company, Barton, Wis., will install two new 160-hp. boilers. It has already awarded contracts for an addition to its power house.

The Maynard Steel Casting Company, 716 Reed Street, Milwaukee, has been granted a permit to build a one-story addition, 80 x 84 ft., for general purposes. It will cost about \$10,000.

The Watertown Machine Company, Watertown, Wis., is more than doubling its former capacity.

The Slyver Steel Casting Company, Milwaukee, has increased its capital stock from \$300,000 to \$400,000 to accommodate its increased business.

C. F. Lamberton, Grand Rapids, Wis., has opened a machine-shop in the Daly Building.

The Wisconsin Dairy Products Company, Stoughton, Wis., will build an addition, 60 x 120 ft., and will install three new 150-hp. boilers.

It is reported that the Gilson Mfg. Company, Port Washington, Wis., gray and malleable iron founder, maker of farm engines, etc., is preparing to manufacture multiple-cylinder motors for tractors and automobiles. William Baumbach, for the last year tractor designer with the Gehl Bros. Mfg. Company, West Bend, Wis., has become associated with the Gilson Company and will have charge of design.

The Farmers' Packing Company, Sauk City, Wis., is having plans prepared for a main building, two stories, 60 x 100 ft., and a power plant, 30 x 34 ft. Its offices are at 154 West Randolph Street, Chicago.

The Manufacturers' Foundry Company, Fifteenth and Oklahoma avenues, Milwaukee, is completing work on an addition to its plant, which will double its capacity. Eighty additional molders will be employed.

The Waukesha Spring Water Company, Waukesha, Wis., is contemplating the erection of a new plant costing \$100,000.

Plans are being prepared by MacElroy & Keupert, Essex Building, Minneapolis, Minn.

The West Allis Scrap Iron Works, West Allis, Wis., has been organized by Greenberg Brothers, who are establishing yards.

The Central City Iron Works, Stevens Point, Wis., has renewed its contract with the Minneapolis, St. Paul and Sault Ste. Marie Railway Company, Minneapolis, for furnishing all grey iron castings required for the Wisconsin Division. The Central company has held this contract for five years.

Articles of incorporation were filed by the Arrowhead Electric Company, Milwaukee. The capital stock is \$25,000 and the incorporators are A. U. Stetten, L. E. Fichan and E. W. Passmore, 1115 Wells Building.

A report from Beaver Dam, Wis., states that Hartford and Beaver Dam capital is organizing a \$10,000 corporation under the style of Beaver Dam Casting Company, which will lease or purchase the Gray Iron Foundry Company's plant at Beaver Dam, which has been idle for several years. The foundry is being overhauled at this time, and it is said that it will be devoted to the production of automobile castings. A force of 100 or 125 men, of which 50 will be molders, is to be employed.

The purchase of 188 lots, or 60 acres of real estate in the northwestern section of Milwaukee, adjacent to the site of the A. O. Smith Company, by interests represented by William J. Zimmers, attorney, Milwaukee, is believed to presage the coming of a large industry, presumably identified with the automobile business. Payments for the property, which sold for an aggregate of nearly \$250,000, were made in drafts on Detroit banks. No further information is available. At the same time that the Zimmers purchase was concluded, interests represented by A. E. Black, Racine, Wis., have taken options on a tract of 200 acres on the shore of Lake Michigan, between St. Francis and Cudahy, suburbs of Milwaukee.

Cincinnati

CINCINNATI, OHIO, Jan. 15, 1917.

The demand for machine tools from domestic sources shows a steady increase. A few orders have been received lately from the Pacific coast. The call for sawmill machinery from the South is also improving. It is stated by leading machine tool builders that the steel mills are buying more machines than at any previous time. Orders are sent in singly, and as a rule, no lists are given out. Quite a number of large lathe orders have been received from this source in the past few weeks.

Canadian business is a little slower, but many firms have unfilled orders for lathes, practically all of them being standard machines. European orders are also scarcer, but there is considerable business from that source that is filtering in.

The machinists' strike that was called over a year ago has now been officially declared off. It was a failure almost from the start and no firms were inconvenienced by it in the past six or eight months.

The Oakley Machine Tool Company, Oakley-Cincinnati, Ohio, has increased its capital stock from \$60,000 to \$110,000. No plant additions are planned, but additional equipment will be installed in the present building.

The Cincinnati Iron & Steel Company, Cincinnati, has increased its capital stock from \$400,000 to \$800,000. Additions to its steel fabricating are planned.

The Cincinnati Horseshoe Company, Cincinnati, announces that the addition to its plant in Cleves, a suburb, will be 60 x 300 ft., one story, and of brick and steel construction.

Henry C. Ezekiel, Provident Bank Building, Cincinnati, as agent is offering at private sale the Cincinnati Equipment Company's railroad car repair shops at Culloms Station near Cincinnati. Edgar M. Johnson is trustee in bankruptcy and the sale is by order of the United States District Court.

The Cincinnati branch of the American Radiator Company plans the erection of a storage warehouse on Summer Street that will be 160 x 200 ft., two stories.

The Davenport Paper Box Company, Cincinnati, is having plans prepared for a factory building that will be erected at Pike and Pearl streets.

The Dayton Engineering Laboratories Company, Dayton, Ohio, has secured a permit for the erection of a small addition to its factory that will be used as a gas production plant.

The Buckley-Ginter Box Company, Columbus, Ohio, has leased a building on Yale Avenue that will be fitted up for the manufacture of cigar boxes.

The Safe Cabinet Company, Marietta, Ohio, is making an addition to its plant that will be 35 x 100 ft., of mill construction.

It is reported that the Haynes Automobile Company, Kokomo, Ind., will erect a large plant at Union City, Ohio, that will be used for the manufacture of automobile bodies.

The Central South

LOUISVILLE, Ky., Jan. 15, 1917.

Local distributors of electrical motors are undertaking to educate purchasers to anticipate their wants, on the expectation that present delayed delivery conditions will continue. One large concern is not able to promise deliveries much sooner than six months on any considerable orders. Gasoline engines are in good demand and there are numerous inquiries being received for new and second-hand steam power plants. Ice-machinery manufacturers continue to receive inquiries, although high prices are tending to discourage purchases in some cases.

The Bee Spring Land & Mining Company, Brownsville, Ky., has been incorporated with capital stock of \$200,000 by James Garnett, Louisville; M. M. Logan, Frankfort, and others, and proposes to develop a large area of Kentucky rock asphalt deposits.

It is reported at Paducah, Ky., that the Illinois Central Railroad has completed plans for additions to its repair shops there.

R. S. Webb, Jr., Lexington, Ky., will erect a three-story brick garage at 420 West Main Street, at a cost of \$9,000.

Joseph Mobley and T. L. Mobley, Elizabethtown, Ky., have purchased a site and will erect a two-story garage which will cost \$7,500 equipped.

The Stout Furniture Company, Salem, Ind., will rebuild its plant itself, under supervision of Guy Shrum, erecting a two-story frame mill building, 62 x 480 ft. The power plant, kilns, etc., will be housed in a second brick structure, 62 x 200 ft.

Mims Hightower, Chattanooga, Tenn., and others, will erect a five-story garage at a cost of \$50,000.

The Continental Piston Ring Company, Memphis, Tenn., has increased its capital stock to \$100,000 and has elected W. P. McCadden president. The expansion of the plant and business is proposed.

St. Louis

ST. LOUIS, Mo., Jan. 15, 1917.

The past week showed no letup in the machine-tool business. Much new equipment is being sought in the market for new industries. Deliveries continue to be a problem, but buyers who are unable to get them are placing orders for delivery at the manufacturers' terms. The demand has no special character. No lists are appearing on the market in this territory, the purchases continuing to be made in a negotiatory way, rather than through competitive bids.

The Gevecker Sheet Metal Works, St. Louis, has been incorporated with a capital stock of \$12,000 by Harry, Charles J. and Arthur Gevecker and will equip to do a general sheet-metal and cornice manufacturing business.

The Automobile Lighting, Ignition & Repair Company, St. Louis, has been incorporated with a capital stock of \$11,500 by Henry C. Thompson and Henry C. Thompson, Jr., John G. Landis and others.

The Cleveland Battery Mfg. Company, St. Louis, has been incorporated with a capital stock of \$15,000 by Julius Shaftal, John K. Sterling and Abraham Shaftal.

The American Tinsel Company, St. Louis, has been incorporated with a capital stock of \$15,000 by John J. Scherrer, St. Louis; Alfred C. Wilson and Alva C. Trublood of Webster Groves, Mo., and will equip a plant.

The Wall Frogless Switch & Mfg. Company, Kansas City, Mo., has begun the construction of a plant estimated to cost \$100,000. J. W. Wall and J. T. McHale are directors of the company.

The Arkansas Brick & Tile Company, Malvern, Ark., will install additional machinery. It has also bought the T. N. Atchinson plant at Perla, Ark., and will add some equipment to it.

The Little Rock Motor Car Company, Little Rock, Ark., has been incorporated with a capital stock of \$15,000 by E. N. Foster, D. E. Armstrong and A. Goodman.

The Success Brick, Tile & Stone Company, Tulsa, Okla., has been incorporated with a capital stock of \$25,000 by J. R. Vinsant, Oklahoma City; A. C. Brown, Sapulpa, and J. Q. Bennett, Kansas City, Mo.

The Dewar Coal Mines Company, Enid, Okla., has increased its capital stock from \$25,000 to \$200,000 for the purpose of developing its property.

Kaw City, Okla., has voted \$10,000; Mooreland, Okla.,

\$10,000; New Wilson, Okla., \$10,000; Wetumka, Okla., \$40,000 for electric light and power plants.

Miami, Okla., will install one 250-kw. electric generator and engine.

The Hall Foundry & Mfg. Company, Muskogee, Okla., has been incorporated with a capital stock of \$50,000 by J. T. Davis, C. E. Hall, Muskogee, and W. L. McLellan of Little Rock, to do a general foundry and iron business.

The Shawnee Ice Machine Company, Shawnee, Okla., has been incorporated with a capital stock of \$60,000 by W. T. Williams, John R. Pring and L. V. Leachman to manufacture ice-making equipment.

The Jennings Pipe Line Company, Jennings, Okla., has been incorporated with a preliminary capital of \$15,000 by J. D. McMahon and others and will purchase oil-pumping equipment, etc.

The Pan American Refining Company, Tulsa, Okla., will increase its capital by \$3,000,000 for the purpose of greatly enlarging its refining plant equipment.

The Dilworth Ice & Storage Company, Dilworth, Okla., has been incorporated with a capital stock of \$15,000 by J. E. Falkenberg, E. S. Henry and K. H. Henry of Medford, Okla., and will equip a ice-making plant of undetermined tonnage.

McKinney & Shields, Checotah, Okla., will equip a two-story garage and repair plant, 60 x 90 ft.

The Purdy Motor Company, Tulsa, Okla., has been incorporated with a capital stock of \$30,000 by R. M. Purdy, L. M. Smith and Albert H. Bell and will equip a machine shop.

H. E. Johnson, Senatobia, Miss., is in the market for one 75-kw. alternating current generator, with exciter.

The Sherouse-Steele Automobile Company, New Orleans, La., will install garage and repair shop equipment to cost about \$10,000.

The Nienstedt Lumber Company, Miltonberg, La., is in the market for a turbine engine, etc.

Texas

AUSTIN, TEX., January 13, 1917.

No material change in the machinery and tool trade since last week is noted. In south Texas spring planting will soon begin and machinery dealers report an unusually good business there.

The Emerson Company of Texas, Fort Worth, has been organized with a capital stock of \$50,000 to assemble automobile trucks and tractors. It will have a floor capacity of 36,000 sq. ft. The officers of the company are J. P. Price, president; Marshall Spoons, first vice-president; B. F. Pettit of Maypearl, second vice-president, and O. B. McCoy, secretary and treasurer.

The City Commission, Dallas, plans an auxiliary pumping plant at a cost of between \$25,000 and \$30,000.

R. F. Williams has organized a company known as the Athens Brick & Tile Company, Athens, with a capital stock of \$65,000. C. H. Coleman is president, George M. Wofford vice-president and R. F. Williams secretary and treasurer. The capacity of the plant will be 600,000 bricks and 2000 tons of hollow building tile per month.

California

LOS ANGELES, CAL., Jan. 8, 1917.

The proposed plant of the Pacific Electric Railway Company, Los Angeles, to be erected at Torrance will comprise 14 shop buildings as follows: Heavy machine shop, erecting shops and paint shop, each 180 x 450 ft.; blacksmith shop, 155 x 200 ft.; freight car shop, 180 x 400 ft.; power house, 50 x 120 ft.; office building, storage buildings, coal bunkers and scrap sheds. The shop structures will be of steel and reinforced concrete. M. C. Halsey, superintendent, 695 Pacific Electric Building, will be in charge of construction.

The Union Oil Company, Union Oil Building, Los Angeles, has acquired a site of 250 acres near Wilmington, Los Angeles Harbor, for its proposed new oil refining plant. Ralph Reed, Jr., is engineer for the company.

The Hydrometric Company, Los Angeles, has been incorporated with a capital of \$20,000 to manufacture meters. D. A. Starbuck and C. D. LaMoree, Los Angeles, and I. B. Funk, Alhambra, are the incorporators. Frank F. Oster, 508 Security Building, Los Angeles, is attorney for the company.

The San Diego Box Board & Paper Company, San Diego, Cal., recently organized, is planning the erection of a plant for the regrinding of waste paper. J. C. W. Stanley and E. Blanckenburg are at the head of the company.

The Presto Electrical Mfg. Company, San Francisco, is planning the erection of a plant at Porterville. A site, with supply of magnesite for manufacture of specialties, is being selected. L. Adelsdorfer is manager.

A wholesale terminal is to be erected at Seventh Street and Central Avenue, Los Angeles, this year. A total cost of \$10,000,000 is figured to complete this work and building plans totaling in value \$2,500,000 have been completed. Two six-story reinforced warehouses 1300 ft. long and two two-story market buildings 1300 ft. long are included. More than 2 miles of railroad sidings will be laid out.

The Pacific Northwest

PORTLAND, ORE., Jan. 9, 1917.

Metal-working machinery is a little quiet, but inquiries are beginning to come in and considerable buying is in prospect for the next few months. Second-hand tools are well cleaned up. Many shops which have held off buying are seriously in need of new tools. The larger shipbuilding and manufacturing plants are figuring on some new equipment most of the time. Some important orders are coming out for two Alaska mines and other developments. Export sales are of considerable volume.

Many lumber plants are now closed for a few weeks for overhauling, but orders for single machines, spare parts and supplies have been fairly active. The car shortage, which has held up the lumber industry for some months, is growing less acute, and if transportation can be had enough business is on hand to assure a very active season.

The effects of the Portland strike have already been felt in Seattle, where the unions are attempting to prevent the use of the steel fabricated by the Portland iron works, in vessels being built on Puget Sound. These yards are now operating under closed shop agreement. Several boilers which were partially constructed in the Willamette Iron & Steel Works, have been shipped to Seattle to be completed.

The Oregon Iron & Steel Company, Oswego, Ore., has resumed work at its pipe foundry, which was idle the latter half of 1916.

Bids are being taken for the construction of the new shipyards of the Todd Shipbuilding & Drydock Company at Tacoma, Wash.

The Great Northern Railway Company plans the enlargement of its yards at Havre and Cut Bank, Mont. About \$500,000 is planned for new shops and freight yards at Great Falls, Mont., during 1917. It is also stated that extensive improvements will be made at Leavenworth, Wash., including the enlargement of its machine shops, etc.

The Gordon Mfg. Company, Portland, has been incorporated with \$50,000 and plans the establishment of a factory to manufacture furniture. The incorporators are H. Gordon, C. C. Stout and Ralph Coan.

The Rhodes Harvester Company, which has operated a plant at Moscow, Idaho, for several years, will move to Dishman, near Spokane, Wash., where a concrete factory, 100 x 200 ft., will be constructed for the manufacture of a special harvester. W. M. Rhodes is president.

The Seattle Construction & Dry Dock Company, which recently completed improvements to its plant costing \$100,000, plans to expend \$150,000 for additional extensions and equipment in the next six months. A new pipe and boiler shop is included in the plans.

The plant of the A. L. Jordan Lumber Company, Kalispell, Mont., was recently destroyed by fire with a loss of about \$30,000. It will be rebuilt.

The Variety Iron Works, Seattle, Wash., established in 1889, has been purchased by the Skinner & Eddy Shipbuilding Corporation, and will become a part of that company's plant.

The Shevlin-Hixon Mill Company, Bend, Ore., plans the installation of a new band saw and other equipment, to cost about \$50,000, which will add 100,000 ft. to its daily capacity.

Canada

TORONTO, ONT., Jan. 15, 1917.

There are at present 1400 men on the payroll of the Gaylord Engineering & Construction Company and the Pratt Engineering Company, while the payroll is about \$30,000 per week. These companies have been awarded the contract for the erection of the arsenal at Lindsay, Ont., for the Imperial Munitions Board. When the plant is completed it will cover an area of 140 acres, and will include 60 buildings.

The Brandon Machine & Implement Works, Brandon, Man., was damaged by fire recently about \$25,000.

The Augustine Automatic Rotary Engine Company, Buffalo, N. Y., has purchased a site at Bridgeburg, Ont., and will erect a plant there.

The Page-Hersey Iron & Tube Company, Guelph, Ont., will build an addition to its plant and install new machinery. Mr. Moseley is superintendent.

The Northern Bolt & Screw Company, Ltd., Seventeenth Street East, Owen Sound, Ont., will build a saw mill and make other additions.

The Canadian Matthew Gravity Carrier Company, 484 Richmond Street West, Toronto, is in the market for an automatic screw machine, with capacity up to 1 in.

L'Air Liquide Société, Maisonneuve, Que., is in the market for a power driven roller 8 ft. long to roll $\frac{1}{4}$ -in. steel plates.

J. W. Murray, Suite 34, Thelmo Mansions, Winnipeg, is in the market for a screw-cutting engine lathe 12 or 13 in. by 5 or 6 ft. bed with automatic feed, power cross feed and compound rest.

The Consolidated Steel Company, 1154 Dundas Street, Toronto, will build an addition to its machine shop to cost \$2,500.

The Chapman Double Ball Bearing Company, Toronto, has commenced the erection of an addition to its plant to cost \$18,000.

The Western Foundry Company, Wingham, Ont., is making preparations for the erection of an addition to its plant to be started next spring.

The Standard Underground Cable Company, Hamilton, Ont., has commenced the erection of an addition to its plant to cost \$12,000.

The Tallman Brass Company, Hamilton, Ont., has awarded contract for an addition to its plant.

The United Shoe Machinery Company, Maisonneuve, Que., will build a tack and nail plant. Construction work will be commenced at once.

The Capital Wire Cloth Mfg. Company, Hinton and Armstrong streets, Ottawa, has awarded contract for an addition to cost \$10,000.

The Dominion Crucible Company, Ltd., will have work commenced at an early date on the erection of a plant at St. Johns, Que., and will be in the market for machinery.

N. B. Pritchard, 40 Quebec Street, Sherbrooke, Que., will build a metal-working factory to cost \$8,000.

Plans are being prepared for a power plant for the Hepworth Light & Power Company, Hepworth, Ont., to cost \$12,000.

Sherbrooke, Que., is in the market for a 10-hp. vertical steam boiler. H. C. King is in charge at the city purchasing department.

Beatty Brothers, Fergus, Ont., propose to build a foundry at Chelsea Green, Ont., of concrete and brick, to cost \$35,000.

The Federal Steel & Foundry Company is having plans prepared for the erection of a steel plant and rolling mill at Cobourg, Ont. J. H. Cole, care the Corbett Foundry & Machine Company, Owen Sound, Ont., is manager.

The Abitibi Pulp & Paper Company, Iroquois Falls, Ont., will build two dams and erect a power plant.

The Brown's Copper & Brass Rolling Mills, Ltd., New Toronto, Ont., will shortly commence the erection of a wire mill and other buildings.

The Keenan Woodenware Mfg. Company, Owen Sound, Ont., will build an addition to its plant to cost \$20,000.

The Canada Stove & Foundry Company, St. Laurent, Que., is having plans prepared for an iron factory.

W. N. McDonald, Esplanade, Sydney, N. S., is purchasing material for the smelter to be erected at Coxheath, N. S.

British Forgings, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Francis G. Bush, George R. Drennan, Alexander G. Yeoman and others.

The Duncan Electric Company, Ltd., Montreal, has been incorporated with a capital stock of \$150,000 by John H. Meager, Henry N. Chauvin, both of Montreal, and others, to manufacture electrical machinery.

The plant of the Preston Car & Coach Company, Preston, Ont., was damaged by fire Jan. 7 with a loss of \$100,000. Eight cars in the course of construction were destroyed. It is stated that work will be resumed in other buildings and that the damaged part will be rebuilt.

Tidewater mills in British Columbia have received an order from the Allies for all the spruce available suitable for aeroplane manufacture. An order has also been let for 500,000 shell cases, requiring over 6,000,000 ft. of lumber. Aside from these is an order for 7,000,000 ft. for ties.

Plans have been completed for additions to be made to the plant of the Coburg Steel Company at Coburg, Ont.

The American Sewer Pipe Company, Akron, Ohio, it is reported, has plans in progress for the erection of a Canadian branch plant at Toronto. It is to be 80 x 200 ft., three stories.

NEW TRADE PUBLICATIONS

Industrial Cars and Factory Trucks.—Lakewood Engineering Company, Cleveland, Ohio. Book No. 16. Concerned with an extensive line of small steel industrial and contractors' cars and trucks. A general description of the construction of these vehicles is presented, followed by a partial list of the industries in which they are used. The lines covered include V-dump, quarry, mine, rotary scoop, scale, hopper, platform and core oven cars; coke barrows, charging trucks, steel wire buggies and factory trucks of different styles. Illustrations and brief descriptions of the various cars and trucks are presented and a number of views of them in use are included. Mention is made of the running gear, draw-bars and couplers, industrial railway track and accessories, etc. Illustrations and brief descriptions of these are included.

Firebrick.—Hiram Swank's Sons, Johnstown, Pa. Calendar hanger measuring 35 x 46½ in. The pad, which occupies about a third of the hanger, gives the figures for the month in large, easily read figures set off by rules. A brief mention of the line of firebrick specialties handled is made, and the whole hanger is remarkably free from advertising.

Grinding Wheels.—Hampden Corundum Wheel Company, Springfield, Mass. Catalog. Size 6 x 9 in.; pages, 111. Shows an extensive line of corundum and carborundum wheels, rubbing bricks and stones, roll scouring blocks and miscellaneous abrasive products. Brief descriptions of the various materials used are presented, with views of the mines from which they are obtained. Following this the several grades of vitrified, elastic, silicate and vulcanite wheels are mentioned, with a concise safety code for the use and care of abrasive wheels and a table showing the combination of grain and grade to be employed for various purposes. Engravings with dimensions of the different shapes of wheels that can be supplied are included.

Internal Combustion Engines.—Leidecker Tool Company, Marietta, Ohio. Form No. 21. Contains illustrations, brief descriptions and condensed specification tables of a line of oil engines ranging from 2 to 160 hp. The advantages of using these engines, which will burn any kind of oil that flows, are presented, together with figures on the possible savings.

Calendar.—Pocahontas Coal Sales Company, Union Trust Building, Cincinnati, Ohio. Calendar hanger measuring 20 x 27½ in. The figures are of the large block type, boxed in with rules, and in the additional spaces are given the calendars for the preceding and succeeding months and brief statements of the different brands of fuel handled by the company and the work for which they are adapted.

Vises, Machinery and Fine Tools.—Athol Machine Company, Athol, Mass. Catalog No. 32. Gives illustrations, brief descriptions and specification tables of a line of vises, grindstones and bench grinding machines. The numbers designating the various lines are printed in heavy type along the outer edges of the pages, and in conjunction with alphabetical and numerical indexes render the finding of any desired tool a comparatively simple matter.

Electrical Apparatus and Supplies.—Western Electric Company, 195 Broadway, New York City. 1917 yearbook. Size, 6¼ x 9½ in.; pages, 1312. Covers an extensive line of electrical supplies and equipment. Wherever possible long text descriptions have been avoided, liberal use being made of engravings and dimension and specification tables to tell the story. The apparatus covered ranges all the way from motors and generators to electric flashlight lanterns for watchmen. A complete alphabetical index is included.

Ball Thrust Bearings.—Rochester Ball Bearing Company, Inc., Rochester, N. Y. Bulletin No. 10. Presents illustrations, a brief description and dimension tables of a line of ball thrust bearings using balls ranging from ¼ to 1 in. in diameter, and intended for use with shafts ranging from ¾ to 5½ in. in diameter. The special feature of the bearing is a solid bronze ball retainer.

Copper Steel.—American Sheet & Tin Plate Company, Frick Building, Pittsburgh, Pa. Pamphlet. Relates to the results of corrosion tests made on steel to which a certain amount of copper has been added. Illustrations of the tests being made supplement the text description of the results secured in resisting corrosion.

Steel Bridges and Buildings.—McClintic-Marshall Company, Pittsburgh, Pa. Calendar measuring 13½ x 27¼ in. Each leaf is divided into four approximately equal parts, the upper one containing the name of the company and an engraving of some contract which it has executed. The other three sections are given over to calendars for three months,

that for the current one being slightly larger, with the dates in heavy figures. A feature of the calendar is the use of small numerals to indicate the number of days that have elapsed since the first of the year in all of the calendars on a leaf. The extra spaces on each of the calendars are given over to brief mention of the range of work handled and the facilities possessed for its execution.

New and Second-Hand Machine Tools.—New Jersey Machinery Exchange, 21 Mechanic Street, Newark, N. J. Calendar hanger, measuring 11¼ x 14 in. The calendar pad is small but the figures are easily read. The line of tools handled is given on the hanger and emphasis is laid upon the character of the service that is rendered.

Iron and Steel.—Ernest Law & Co., Harrison Building, Philadelphia, Pa. Calendar hanger, measuring 10¼ x 13¼ in. The pad of this calendar occupies practically the entire hanger, there simply being room enough outside of the pad for the name of the firm, the lines handled and the address. The dates on the pad are printed in somewhat fanciful but easily read figures on a contrasting background, and each day is boxed in by rules.

Heat Insulation.—Kieselguhr Company of America, 11 Broadway, New York City. Pamphlet. Treats of the Sil-O-Cel insulating brick, powder and cement, which are designed as a backing for firebrick in furnace walls, boiler settings and other equipment to keep the heat in the zone of its greatest activity. The use of the material is illustrated and described and a partial list of users is included.

Die Castings.—Doehler Die-Casting Company, Court and Ninth streets, Brooklyn, N. Y. Catalog entitled "Creating an Industry." Deals with the various stages of the metal casting art from prehistoric to modern times, with illustrations of the different steps. The die-casting industry, which has been developed within the past decade, is described, the text being supplemented by tables of the alloys that can be cast and a number of engravings of the various parts produced in this way. Several views in the factories of the company at Brooklyn, Newark, N. J., and Toledo, Ohio, are included, and a number of testimonial letters are reproduced.

Rust Proofing.—Parker Rust-Proof Company of America, Detroit, Mich. Catalog. Relates to the company's process of treating black iron to prevent attacks of rust. A description of the process, which consists of cleaning, processing, drying and oil dipping, is presented, and a number of engravings showing articles treated in this way are included. The accessories employed in treating the articles are illustrated and briefly described.

Metal Working Machinery.—Gisholt Machine Company, Madison, Wis. Pamphlet. Illustrates and describes a line of turret lathes, vertical boring mills and universal tool grinding machines, together with the plant and organization back of them. This is done by a set of reprints of advertisements that have appeared in the trade journals.

Photometer Sight Box.—Leeds & Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa. Bulletin No. 631. Points out the advantages of using a photometer sight box of the contrast type. The description of the box is gone into at some length and the text is supplemented by numerous illustrations of the box and its parts.

Ice and Refrigerating Machinery and Supplies.—Shipley Construction & Supply Company, 60 Warren Street, Brooklyn, N. Y. Calendar measuring 20 x 28 in. Approximately two-thirds of each leaf is given over to the calendar, which is printed in large and easily read block figures, each day being set off by rules of a contrasting color. The calendar is quite free of advertising, the upper third being given over to an illustration of the company's plant, with the firm name and the lines manufactured. The extra spaces on the leaves contain brief mention of the various pieces of apparatus built and the work they are designed to do.

Indoor Electric Vapor Lamps.—Cooper Hewitt Electric Company, Eighth and Grand streets, Hoboken, N. J. Bulletin No. 67. Pertains to a line of automatic lighting vapor lamps for indoor use where direct current is available. After describing the general construction of the lamp, which consists of but four parts, and touching upon the characteristics of the light produced, which include absence of glare and heavy shadows, higher efficiency and low maintenance cost, the various types of lamps are illustrated and briefly described. Dimension diagrams and tables of the various combinations that can be furnished in each style are included.

High-Speed Steel.—Vanadium-Alloys Steel Company, Pittsburgh, Pa. Folder. Describes Vasco-Marvel, a semi-high-speed steel containing approximately 11 to 13 per cent of tungsten. The steel is not a cutting one primarily, but is intended for use in tools for hot work, such as dies, shear blades, crowning tools, nut boxes, piercers, cutters, splices, etc. Instructions on the heat treatment and a table of the standard classification of extras are included.

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